CARTE GÉNÉRALE DES DÉCOUVERTES de l'Amiral de Fonte,

et autres Navigateurs Espagnols, Anglois et Russes pour la recherche du Passage à la Mer du Sud.

Par M. De l'Isle *de l'Académie royale des Sciences &c.*

Publiée à Paris en Septembre 1752.

CARTE *dressée Sur la lettre de l'Amiral de* FONTE *par l'Ecrivain de la Californie.*

MER DE TARTARIE

Terre où les Jesuites ont été jusqu'a 66 d. de latitude

Pet. de Ronquille

L. de Fonte

L. Velasco

R. de Parmentiers

Conasset

R. de los Reyes

Archipel S. Lazare ou Detroit d'Anian

Grande Terre découverte en 1723 ou s'enfuient les Tzutzy l'orsqu'ils sont poursuivis par les Russes qui ne les ont pas encore soumis.

Tzutzy

Cap Chalagaskoi

Découvertes

Olutorski

Cercle Polaire

Terres vues par M. Spanberg en 1728. s'approchant a present par les Russes qui en font de tres belles fourrures.

Isle Bernard

Presqu'Isle de Conibasset

Cette Riviere a 3 Cataractes

R. Bernarda

LAC VALASCO

Terres vues par les Russes en 1741 ou le Capitaine Tchirikow perdit sa Chaloupe armée de 10 hommes

Archipel St Lazare

R. de Los Reyes

Ville Indienne

Port Arena dans la riviere

Montagnes de Glace

Detroit de l'Alderman fondu

Detroit de Jacques le Lancastre

I. Bassot

BAYE DE BAFFIN

LAC BERNARDA de l'Amiral de Fonte

Grand Fleuve ou Courant d'Eau douce

Grande Isle tres peuplée

On trouve dans ce Lac depuis 30 jusq'a 60 Brasses

LAC DE FONTE

8. Cataractes qui font en tout 30 pieds de hauteur

BELLE

Hauteur des Terres

Terre d'Yeco

Kamtschatka

Mer de Penginsk

Terres vues par Jean de Gama

Isle Tritonnoi

Terre de la Compagnie

Isles des Sœurs

Isles des Etats

Cap Patience

Port de Retour des Russes au Kamtchatka en 1732

Route du Cap.ne Beering et des Russes du Kamtchatka en 1731

Route du Kamtchatka

Terres dont le Capitaine Beerings a vu des indices dans son premier Voyage en 1728.

CÔTES vues par Mrs Tchirikow et De l'Isle en Septembre 1741

Retour de l'Amerique au Kamtchatka de la Croyere en Juin et Juillet 1741

l'Amerique par le Capitaine Tchirikow et Mr. De l'Isle en Aout et Septembre 1741

Terres vues par M. Spanberg en 1728. s'approchant a present par les Russes qui en font de tres belles fourrures.

Il y a dans cette entrée une Isle avec une haute Montagne en forme

XUM

CARTE GÉNÉRALE DES DÉCOUVERTES de l'Amiral de Fonte,

et autres Navigateurs Espagnols, Anglois et Russes pour la recherche du Passage à la Mer du Sud.

Par M. De l'Isle *de l'Académie royale des Sciences &c.*

Publiée à Paris en Septembre 1752.

'Amiral de FONTE
lifornie.

Fonte
Port de Rensquilles
d'Anian

Grande Terre découverte en 1723 ou s'étendent les Tzutzy lorsqu'ils sont poursuivis par les Russes qui ne les ont pas encore soumis.

Tzutzy
Cap Chalagirskoi
Bai R.
Yanskoi R.
Anadirskoi
Oriv
Anadir R.
Tchemaina
Penina R.
Tschaunskoi R.
Yalosch R.
Pasha R.
Olutorski
Cercle Polaire
Découvertes et de
Terres vues par Spanberg en 1728. françois qui en apportent de très belles fourures.
Celle Riviere a 3 Cataractes
Isle Bernard
Presqu'Isle de Conibasset
R. Bernarda
LAC VALASCO
Terres vües par les Russes en 1741 ou le Capitaine Tchirikow perdit sa Chaloupe armée de 10 hommes
Archipel St Lazare
R. de Los Reyes
Il y a dans cette entrée une Isle avec une haute Montagne en forme de Colonne
Retour de l'Amerique au Kamtschatka de la Croyere en Juin et Juillet 1741
l'Amerique par le Capitaine Tchirikow et Mr De l'Isle en Aout et Septembre 1741
de l'Inde commande par M. de
Route du Capne Beering et des Russes en 1731
Port de Retour des Russes au Kamtchatka en 1732
Kamtschatka
Terres dont le Capitaine Beerings a eu des indices dans son premier Voyages en 1728.
CÔTES vuës par Mrs Tchirikow et De l'Isle en Septembre 1741
J. de Beering
Bolcheretzkoi
Nauvel
Kamtschatka
Retour des Russes au Kamtchatka en 1732
Kamchatka
Ostrog
Jakutsk
Irkutsk
Lac que le Capitaine de Fonte a parcouru
Capitaine Bernarda detaché par l'Amiral l'espace de 436 Lieues
Montagnes de Glace
Détroit de l'Alderman Fonds
Détroit de Jaques de Lancastre
I. Bassot
Grand Courant d'Eau
Courant
Rav. des Parmeliers
Cataracte
Ville Indienne
Port Arena dans la riviere
Hauteur des Terres
Mines et Ville Indienne
Ria de Haro
Grande Isle tres peuplée
On trouve dans ce Lac depuis 20 jusq. 60 Brasses
8 Cataractes qui font en tout 32 pieds de hauteur
R. du Cerf
Lac Mashingi ou la Grande Eau
Lac des Forts
R. Bourbon
R. Danois a present Churchill
R. St Therese ou Nelson
Nouv. Galles
C. Churchill
C. Tatnam
C. Perse
C. Lobkowitz
Plate Côtes des Indiens Nation
R. du Cygne Marin
Cap des Esquimaux
Cap Elisabeth
I. de Resolution
Mistake Bay
Detroit d'Hudson
C. Walsingham
Nottingham
Marguerite
Eau de Wager decouverte en 1742
B. de Repulse decouverte en 1742
Cap Comfort
Markham
Tompleton
I. de Marbre
B. de Douglas
Pointe du Nord Est
Ville Indienne
Lac de Rensquille
Detroit de Rensquille
Lac de Fonte
Lac des Esquimaux
Lac des Christinaux
Pais des Outaouas ou de Bourbon
Lac Anistiguoigamec
Lac des Assiniboulets
L. Rouge
Source du Mississipi
Sioux de l'Ouest
MER DE L'OUEST
et parcourue par J. de Fuca en 1692
Quivira
le Missouri
Tegua
Colorado
Baye de Baffin
Isle de Cumberland
et de James ou Jaques
Baye de Hudson
Lac de Bernard
Lac de Valasco
Lac de Fonte
Lac de Bernard
Lac de Valasco
Lac de Fonte
Lac des Esquimaux
Lac des Christinaux
Lac des Assiniboulets
Lac Anistiguoigamec
Lac Mashingi ou la Grande Eau
Lac des Forts
Lac de Rensquille
Lac de Fonte
Lac des Esquimaux
Lac des Christinaux

L. Velasco
Conasset
R de los Reyes
Archipel S. Lazare ou Detroit d'Anian
Découvertes de l'Amiral de Fonte
LAC BERNARDA
LAC VALASCO
LAC DE FONTE
Grand Courant d'Eau
Cercle Polaire
Tzutzy
Oluторski
Kamtchatka
Terre d'Yeco
Mer de Kamtchatka
Mer de Penegmsk
Retour de l'Amerique au Kamtchatka de la Croyere en Juin et Juillet 1741
l'Amerique par le Capitaine Tchirikow et Mr De l'Isle en Aout et Septembre 1741
Route du Vaisseau François la St Antoine de Padoe commandé par M. de Fonclat en 1709
CÔTES vues par Mrs Tchirikow et De l'Isle en Septembre 1741
Terres vues par les Russes en 1711 ou le Capitaine Tchirikow perdit sa Chaloupe armée de 10 hommes
Il y a dans cette entrée une Isle avec une haute Montagne en forme de Colonne
Entrée decouv. par Jean de Fuca en 1692
Entrée decouv. par Martin d'Aguilar en 1603
Cap Blanc de St Sebastien
CALIFO
C. Mendocin
B. de Pinos
Port St Franço
B. de Nieves
P. de Monterey
Port Arena dans la rivier
Ville Indienne
Conasset
Grande Isle très peuplée
On trouve dans ce Lac depuis 40 jusq 60 Brasses
8. Cataractes qui font en tout 32 pieds de hauteur
Riv. des Parmentiers
Riv. de Haro
Lac Washington ou la Grande Eau douce
Detroit de l'Allemand
Jacques de Lamberville
Eau de Vie découverte en 1743
Terres dont le Capitaine Beerings a eu des Indices dans son premier Voyages en 1728.
Terres découvertes en 1723 ou les Tzutzy l'orsqu'ils sont poursuivis par les Russes qui ne les ont pas encore Soumis.
Terres vues par Mr Spangberg en 1728, lesquelles les Russes qui en apportent de très belles fourures.
Celle Riviere a 3 Cataractes
Isle Bernarda
Presqu'Isle de Conibasset
Route du Capne Beering et des Russes en 1732
Port de Retour des Russes au Kamtchatka en 1732
Port de Kamtchatka
Port d'Avatcha ou de St Pierre et St Paul
Terres vues par Jean de Fuca
Isle Trifonnoi
Isles de la Compagnie
Les 2 Sœurs
Les Barrens
Les Etats
Cap Patience
Cap Deroches
Cap Chalagirskoi
Cap Tchukotskoi
Cap Onmen
Cap Anadirskoi
Cap Tchaplinskoi
Cap Tchukotskoi Noss
Cap Yakutskoi
Cap Oriental
Cap Tchukotskoi
Cap Tchukotskoi Noss
Cap Tchukotskoi
Cap Tchukotskoi Noss
Cap Tchukotskoi
Cap Tchukotskoi Noss

Découvertes et de ses Capitaines en 1640

Cercle Polaire

LAC BERNARDA

LAC VALASCO

LAC DE FONTE

BAYE D'HUDSON

MER DE L'OUEST

CALIFORNIE

Lac que le Capitaine Bernarda de Fonte a parcouru l'espace de 436 lieues

Grand Courant d'Eau douce

Grande Isle très peuplée

On trouve dans ce Lac depuis 50 jusqu'à 60 Brasses

Isle Bernarda

Presqu'Isle de Conibasset

Celle Raviere a 3 Cataractes

R. Bernarda

Terres vues par les Russes en 1728, lesquelles a reconnu par les Russes qui en apportent de très belles fourures

Terres dont le Capitaine Beerings a vu des indices dans son premier Voyages en 1728.

CÔTES vues par Mrs Tchirikow et De l'Isle en Septembre 1741

Terres vues par les Russes en 1741 ou le Capitaine Tchirikow perdit sa Chaloupe armée de 10 hommes

Retour de l'Amerique au Kamtchatka de la Croyere en Juin et Juillet 1741

l'Amerique par le Capitaine Tchirikow et Mr De l'Isle en Aout et Septembre 1741

Il y a dans cette entrée une Isle avec une haute Montagne en forme de Colomne

Entrée decouv. par Jean de Fuca en 1692

Entrée decouv. par Martin d'Aguilar en 1602

Cap Blanc de St Sebastien

C. Mendocin

Route de l'Amiral de Fonte en 1640

Route du Capne Beering et des Russes en 1735

Port de Retour des Russes au Kamtchatka en 1732

Port de Retour des Russes au Kamtchatka en 1730

Route de Pde commande par M. de Fonda en 1709

Tzutzy

Olutorski

Kamtchatka

Kamchatka

Tchaun R.

Penzinsk

Tareu R.

Pecana R.

Anadirskoi

Tchemaia R.

Anadir R.

Berezofka R.

Onemen R.

Alutor R.

Kolech R.

Tchegodat R.

Yamka R.

Chaia R.

Kap Chalaginskoi

Karginskoi I.

Port de Retour des Russes au Kamtchatka

I de Beering

Apatcha ou de St Pierre et St Paul

Terres vues par Spanberg en 1728

Isle de la Trinité découverte par Lopez en 1728

Isle de l'Apôtre S. Tadée

Isle de St Laurent découverte par Lopez en 1728

Archipel St Lazare

R. de Los Reyes

Rio de Haro

Cataractes

Riv. des Parmentiers

8 Cataractes qui font en tout 32 pieds de hauteur

Lac Washington ou la Grande Eau

R. du Cerf

Lac Anisquaouigame

Païs des Outagamis ou de Bourbon

L. Christinaux

L. Rouge

Sept Nations

Sources du Mississipi

Sioux de l'Ouest

Eau de Wager découverte en 1746

Ville Indienne

Detroit de Baring

Pointe du Nord Est

Marbre

Tempeon de Marbre

R. de Douglas

Cap des Esquimaux

Hauts Côtes des Indiens Nation

C. Churchill

R. Danois a prouvé Churchill

Ga Courant

Lac des Forts

R. Bourbon

R. St Therese ou Hayes

Nouv. Galles

C. Lokoyat

C. Walsingham

Nottingham

Marfels

Cumberland

Ile Marbre

Ile Nouvelle

Ile Charlton

Ile Digges

Ile Salisbury

Ile Resolution

Ile Mansfield

Ile Southampton

Ile Coats

Ile Nottingham

Ile Mansfield

Ile Resolution

Ile Salisbury

Ile Digges

Ile Charlton

Ile Nouvelle

Ile Marbre

VOL. III, PP. 205-230, PL. 21 JANUARY 28, 1892

THE

NATIONAL GEOGRAPHIC MAGAZINE

THE CARTOGRAPHY AND OBSERVATIONS OF BERING'S FIRST VOYAGE.

BY

GENERAL A. W. GREELY.

(*Presented before the Society March* 20, 1891.)

It was with no ordinary pleasure that the members of the National Geographic Society listened to the critical review and admirable essay on Bering's first expedition, 1725–1730, read before this Society, together with a translation of Bering's report on the expedition in question, by one of our learned and distinguished members, Professor William H. Dall. The subject then under consideration is one of great interest, and this Society owes a debt of gratitude to Professor Dall for his assiduous labor in collating and translating the available data on this voyage, and must indorse the general conclusions reached in a critical essay which is the result of careful, conscientious research conjoined to much erudition. It is especially fortunate, in view of the vagueness of Bering's report, that it should have been translated and reviewed by a traveler and investigator so thoroughly familiar with the topography of Bering strait and the adjacent region.

It may appear somewhat presumptuous for the present writer to further dwell on some points of subordinate importance, even with the view of supplementing the investigations of Professor Dall; but he is encouraged to the effort by the admirable spirit in which that gentleman works, which is so clearly indicated in his own words: "I am well aware this paper cannot be regarded as a finality, but as a contribution to the geographical history of North America it will not be without its value." This spirit encourages every one to contribute his mite to elucidate the history of this interesting and ill-known period.

The supplementary remarks now presented mainly relate to two points: first, the cartographic reproduction of Bering's discoveries; second, the alleged observations of lunar eclipses in Kamshatka by Bering and his lieutenants in 1728–'29.

In attempting to add to Professor Dall's essay or to elucidate some points, it is but natural to felicitate one's self that chance has put in one's way rare data in the shape of text and map. Nevertheless, much difficulty has been experienced in efforts to consult publications and charts bearing on this subject, as supplementary to the data in the writer's own library. Fortunately, among his personal books and maps are the following, which have escaped the critical, if not casual, observation of Professor Dall:

1. The original Hague* edition of Père du Halde, which Dall was unable to consult; it is entitled "Description Géographique, Historique, Chronologique, Politique, et Physique de l'Empire et de la Tartarie Chinoise," etc. 4 vols., 4°: à la Haye, 1736.

2. De l'Isle's scattered essays, entitled "Mémoires pour servir à l'histoire et au progres de l'Astronomie, de la Géographie, et de la Physique, etc., etc.: à St. Petersbourg, de l'imprimeris de l'Académie des Sciences. MDCCXXXVIII [1738]."

3. "Atlas Russien: contenant une Carte Générale et dix-neuf Cartes particulieres de tout l'Empire de Russie et des Pays limitrophes construites conformément aux règles de la Geographie et aux dernières Observations. Par l'Académie Impériale des Sciences de St. Petersbourg. St. Petersbourg, 1745."

This was the first atlas published in Russia in the map department established by order of Peter the Great in the Academy of Sciences of St. Petersburg. It includes a general map of the Russian Empire and nineteen maps of provinces.

* The first edition, in French, was published at Paris, 4 vols., folio, 1735.

4. "Carte de la Sibérie et des Pays voisins. Pour servir a Histoire générale des Voyages par le S. Bellin, Ing. de la Marine," two parts, undated, but to which E. Dufosse, of Paris, assigns the date of 1749. The atlas for this work was originally published by Abbe Prevost at Paris, 1747, et seq., the charts being engraved by Bellin.

This chart appears on casual inspection to be more accurate than either that of d'Anville or of de l'Isle, or of the Russian atlas.

5. The very interesting and valuable map of J. N. de l'Isle, Paris, 1752 (without, however, the accompanying memoir).

I do not think the original map has ever fallen under the notice of Professor Dall, although a garbled reproduction of it is mentioned in his review as follows:

"A chart which deserves notice, though almost wholly fictitious, being chiefly devoted to the spurious discoveries of the alleged Admiral de Fonte, was issued by J. N. de l'Isle with the concurrence of M. P. Bauche or at his suggestion. It appeared at Paris in 1752, and was copied for Jeffery's second edition of voyages from Asia to America in 1764. I do not know if this copy appeared in the first edition, but presume it did."

As the original of de l'Isle's chart (1752) is here exhibited to-night, it is evident that Jeffery was careless, and that the map, which I infer Dall has never seen, is really more valuable than is set forth in his address; otherwise so critical an observer as Dall would not have said: "I suspect this (referring to d'Anville's map of 1753, with Bering island thereon) is the first publication of a cartographic kind on which Bering island is laid down, as the map of the Imperial Academy of Sciences, embodying the geographical results of Bering's voyage to the coast of America, was not engraved until a year later, while de l'Isle's of 1752 does not contain them." You will see that this is an error, for the "I (sle) de Beering" is plainly inscribed on the map. (This map has been reproduced by photolithography and forms the accompanying plate 21.)

Dall further describes the copy of this map in the following terms:

"Connected with America and north of the Chukchi peninsula is land with an island off it corresponding not badly to Wrangell and Herald islands and marked 'Discovered in 1722.' It is possible that this land is a hypothetical compound of the land reported by the Chukchis east of the strait with that which they knew to be visible in clear weather from Cape Yakan, more or less confused accounts of which had long been current among persons interested in these regions."

The legend on the original chart indicates that Dall's surmise is correct, for the copy is not only abbreviated, but is in error as to date. On the original it runs: "Grande Terre découverte en 1723 au s'enfeuit les Tzutzy l'orsqu'ils sont poursuivis par les Russes que ne les ont pas encore soumis."

There is another important legend on a very large imaginary island about five degrees of longitude to the east of Bering island. On the northern side of this land the text runs thus: "Terres dont le Capitaine Beering's à en des indices dans son premier voyages en 1728." On the southern edge is the legend: "Cotes vues par Mrs. Tchirikow et de l'Isle en Septembre 1741." Immediately south of the land are two route tracks, with these legends: "Route du Kamtschatka a l'Amerique par le Capitaine Tchirikow et Mr. de l'Isle de la Croyere en Juin et Juillet, 1741," "Retour de l'Amerique au Kamtschatka en Aout et Septembre 1741." The latter route track touches an indentation in the southwestern coast, as though the vessel had entered the bay, which has five mountains in the background.

The legend—"Terres vues par les Russes en 1741 où le Captaine Tchirikow perdit sa Chaloupe armée de 10 hommes"—is likewise of interest, as controverting the statement that "De l'Isle's (chart) of 1752 does not contain * * * the geographical results of Bering's voyage to the coast of America." It embodies a large part, but not all, of the discoveries.

6. Buache's memoir and maps entitled: "Considerations géographiques et physiques sur les Nouvelles Decouvertes au Nord de la Grande Mer, appellee vulgairement la Mer du Sud; avec des Cartes qui y sont relatives. Par Philippe Buache, Premier Geographe," etc. A Paris M.DCC.LIII [1753], 4°, 158 pp. With my copy there is a separate pamphlet, consisting of 13 maps, folio, with a preface and index, quarto. The preface (4°, two leaves unpaged) is entitled: "Exposé des Découvertes au Nord de la Grande Mer, etc., etc. Presenté au Roy le 2. Septembre 1753, par Philippe Buache, etc." The index (4°, 4 pp.) runs: "Liste des Cartes concernant les Nouvelles Découvertes au Nord de la Grande Mer, &c. Par Philippe Buache, &c. Janvier, 1755."

These thirteen maps are very interesting. The first and second charts bear particularly on the subject of this paper. The first is entitled: "Carte des Nouvelles Découvertes entre la partie Orient'le de l'Asie et l'Occid'le de l'Amerique avec des Vues sur la Gr'de Terre reconnue par les Russes en 1741 &c., &c. Dressée

par Philippe Buache. Presentée a l'Acad. des Sciences le 9. Aout 1752 et approuvée dans son Assemblée du 6 Septembre suivant."

This map, somewhat fuller in details than that of de l'Isle, shows: "Découvertes des Russes depuis 20 ans." There are route tracks of the first expedition marked: "Route des Russes au N.E. et au N. en 1728 et 1731," and "Retour en 1731." Two route tracks of the later voyage have the legends: "Route de Kamtchatka a l'Amerique en 1741. Retour des Russes au Kamtchatka." Other legends are as follows: "Isle Beering;" "Detroit du Nord" (Bering strait); "Terre déc. en 1723 par les Russes, ou Isle dont le P. Avril a parle" (large land near Wrangell island); "Terres reconnues par les Russes" (American coast in latitude 56 N.); "Côtes vues par les Russes en 1741; Port ou les Russes ont aborde" (fictitious and extensive land east of Bering island, on which are also the following: "Puchochotskes selon Strahlenberg," and "Terre habitée, ou Presqu' Isle, que je suppose joindre les découvertes des Russes avec celles de l'Am'l de Fonte").

The second map, "Carte des Découv'tes de l'Am'al de Fonte avec les Terres vuës et reconnues par les Russes, par Philippe Buache," has other pertinent and interesting legends. In Bering strait appears: "Beering a trouvé au N. et a l'E. de ce parage que la Mer y etoit libre," and immediately eastward on the American coast below the parallel of the arctic circle: "Terre découv. en 1731, et ou les Russes ont rencontré un home qui s'est dit habitant d'un gr'd Continent." On the American coast from 55° to 57° north latitude: "Terres déc. en Juill., 1741, et où les Russes ont laisse 10 homes qu' ils n' ont pu rejoindre." Over "Terre habitée," a large land just east of Bering island: "Le Capitaine Beering a trouvé dans ce parage de 50 à 60 deg. les Indices d'une Côte et une gr. Riv. ou il a envoye quelqu's homes qui ne sont revenus."

It is evident that these maps must have been actually published as early as September 2, 1753, the date on which was presented the "Exposé des Découvertes, etc., au Roy," but the charts give no further indication than the legend: "Publiée sous le privilege de l'Acad. R'le. des Sc. du 6 Sept'bre, 1752: à Paris." The actual date of issue may or may not have been earlier than the map of de l'Isle of September 9, 1752.

7. (Possibly most important of all) a letter of an officer of the Russian Navy. This appeared first in Russian, presumably

printed at St. Petersburg in 1752 or 1753; the original Russian I have not seen. It was translated, however, into French and printed at Berlin (not dated) in 1753, under the following title: "Lettre d'un officier de la Marine Russienne. A un Seigneur de la Cour concernant la carte des nouvelles découvertes au nord de la mer du Sud et le mémoire qui y sert d'explication. Publiée par M. de l'Isle, à Paris en 1752. Traduit de l'Original Russe, à Berlin, chez Haude et Sperer, Libraires de la Cour et de l'Academie Royale (1753)."

This edition forms part of my library, and is the only copy which I know of in the United States. It is not to be found in the Library of Congress, the Astor Library, the Boston Athenæum, or the Boston Public Library. It is not even in the Royal Library at St. Petersburg, but, as might be anticipated, is in the British Museum. I find it nowhere catalogued in any bibliography of arctic or subarctic works. The French edition was inserted, with some changes, it is believed, in the eighteenth volume of the Nouvelle Bibliotheque Germanique.

8. "A letter from a Russian Sea-Officer to a Person of Distinction at the Court of St. Petersburg, containing Remarks on Mr. de l'Isle's Chart and Memoir relative to the New Discoveries North and East from Kamtschatka, together with some Observations on that Letter by Arthur Dobbs, Governor of East Carolina, to which is added Mr. de l'Isle's Explanatory Memoir on his Chart." 8vo, 85 pp., London, 1754.

The "Arthur Dobbs" who published this edition, and who possibly was the translator thereof, is well known as the energetic promoter of the discovery of the "northwest passage," and was personally interested in discovery voyages to Hudson bay. The explanatory memoir of de l'Isle's chart is a translation of the memoir previously mentioned as belonging to the map of 1752, which memoir I have not been able to consult in the original French. It may be added that Dobbs' reproduction of the "Letter from a Russian naval officer" is not accurate, the translation in places being so carelessly or indifferently made that the text cannot be relied on for critical purposes.

This English translation is to be found neither in the Library of Congress, the Boston Public Library, the Boston Athenæum, nor in the Library of the American Geographic Society. It is, however, in the Astor Library, and a second copy at one time belonged to the library of Mr. J. C. Brevoort.

9. "Mappe Monde. Carte Universelle de la Terre. Par J. B. Nolin, Geographe." 1755, 20½ x 27 inches. On this appear the legends: "I. de Beering; Detroit de Nord; Terres découvertes par les Ruses [sic] en 1741; Terres veues en 1741."

It is quite possible that this is the first map of the world on which Bering island was charted.

10. John Christopher Adelung's very interesting history of sea voyages for the discovery of a "northeast passage," which was published in quarto form under the following title: "Geschichte der Schiffahrten und Versuche welche zur Entdeckung des Nordöstlichen Weges nach Japan und China von verschiedenen Nationen unternommen worden. Zum Behufe der Erdbeschreibung und Naturgeschichte dieser Gegenden entworfen von Johann Christoph Adelung, Herzoglich Sachsichen Rath Halle bey Johann Justinus Gebauer, 1768."

11. Notice des Ouvrages de M. d'Anville. 8°, Paris, An. X [1802], 120 pp. By Barbie du Bocage.

In addition to these and other works from my own collection, I have consulted at the library of the United States Naval Observatory, in this city, "Histoire de l'Academie Royale des Sciences, Année 1750," Paris, 1754, and the same, "Année 1754," Paris, 1757, which contain articles on de l'Isle's manuscript maps of 1731 and 1752, the latter being substantially identical with the published map of 1752.

From Dall's review we learn that Lauridsen is responsible for the statement that the discoveries of Bering in his first voyage were shown on a chart made at Moscow in 1731, but no authority is given as to the cartographer. Later I shall adduce evidence to confirm Dall's opinion that the Moscow map was merely a copy, such as were distributed to personages of importance or to those connected with the expedition. It is further susceptible of, as I think, tolerably satisfactory proof that the outlines of Kamshatka, with fairly correct meridians of longitude, were made public in a chart by de l'Isle not in 1731, but the year following, 1732, and it is likely that the lost map of that year was substantially reproduced in the chart of 1752, which I have the pleasure of now presenting for your examination.

De l'Isle presented this map to the Academy of Sciences of Paris on April 8, 1750. The circumstances connected with the

presentation have been drawn from the official records of the Royal Academy of Sciences, and are as follows:*

Cette année (1750) M. de l'Isle lut à l'assemblee publique de l'Acadèmie, un Mémoire sur les Nouvelles Découvertes au nord de la mer du Sud; et presenta en meme temps une Carte que M. Buache avoit dressée sur ses Mémoires, et qui representoit ces Découvertes avec toute la partie du Globe terrestre, à laquelle elles appartiennent. Ces Ouvrages, alors manuscrit, furent depuis publiés en 1752, M. Buache presenta dans cette meme année la première partie de ses Considérations géographiques sur le meme sujet, avec les Cartes qui y étoient relatives.†

"Muni de ces premières connoissances [referring to the discoveries of 1729–1739] M. de l'Isle traça une carte qui representoit l'extremite orientale de l'Asie, avec la partie opposée de l'Amerique septentrionale qui y répond, afin de faire voir aisément ce qui restoit à découvrir, et il dressa un Mémoire dans lequel il exposoit la manière qu'il jugeoit la plus avantageuse pour faire ces découvertes." ‡

"Mais les vaisseaux Russes qui avoient été envoyés pour les découvertes dont nous venons de parler (1731–1741), n'étant pas encore revenus lorsqu'elle lui fut envoyé il extremit l'examen après son retour en France, qui étoit assez prochain. A son arrivée, il communiqua ses vues et cette relation a M. Buache; celui-ci, qui par la," etc., etc.¶

"Cette Mémoire [de l'Isle, 1750] étoit accompagnée d'une carte qui étoit comme l'esquisse du système géographique de M. de l'Isle sur cette partie."*

It has been pointed out by several authorities that some of M. de l'Isle's statements in his memoir of 1752 are to be received with caution, especially his elaborate endeavors to impress the Paris Academy with the belief that the discoveries of Bering subsequent to the first voyage were the result of his (de l'Isle's) own carefully considered instructions. In this connection Adelung says:

"De l'Isle, in his Explication de la carte des nouvelles découvertes au Nord [1752], traces out his proposed route quite differently [referring to de l'Isle's previous statements in his report to the St. Petersburg Academy in 1732], somewhat as if it had been outlined in view of accomplished facts."

---

* Extracts from Histoire de l'Acadèmie Royale des Sciences, Année MDCCL (1750), 4°, Paris, 1754; and the same, Année 1753, 4°, Paris, 1757.

† *Loc. cit.*, "Année MDCCL," p. 142

¶ *Ibid.*, p. 151.

‡ *Ibid.*, p. 145.

* *Loc. cit.*, "Année 1753," p. 263.

It behooves us, then, to inquire carefully into the authenticity of the alleged map of de l'Isle of 1731, since if he antedated his opinions as to the route he might also have antedated his map. Fortunately we do not have to depend only on de l'Isle's own statement, either in 1750 before the Academy of Sciences at Paris, or as published in 1738 at St. Petersburg and printed at the printing office of the Royal Academy; for we also have extraneous and convincing evidence, even from sources critically hostile to the French astronomer.

M. de l'Isle, in his Mémoires sur les Nouvelles découvertes au Nord de la mer du Sud, Paris, 1752, says:

"After I had, near twenty years ago, got these first informations of the longitude of Kamschatka by means of Captain Bering's map and journal, I made use of them in constructing the map, representing the eastern extremity of Asia, with the opposite coast of North America, in order to show at once what still remains for discovery between two large parts of the world.

"This map I had the honor of presenting to the Empress Anne and the Senate, in order to animate the Russians to undertake these discoveries, and it took effect, this princess ordering a second voyage to be made according to the plan which I had drawn up for it."

"Two maps," he adds, were presented to the Academy in Paris, "one being a copy of the map which I had drawn at St. Petersburg, 1731, on Captain Bering's first voyage, and had the honor of presenting to the Empress Anne and the Senate, with a manuscript memoir explaining its use and construction." The other map (from which the lithograph before you was lately reproduced) was, according to de l'Isle, only changed by adding the later discoveries of Bering and his lieutenants.

De l'Isle further says of this chart:

"The second manuscript map which I laid before the Academy at Paris was in all respects like the former, only with the advantages of the new discoveries made since 1731."

Ph. Buache, the French geographer, made for de l'Isle a reduced copy of the second chart, and it is supposed that the map before you is a substantial reproduction of that copy.

In the preface to de l'Isle's scattered essays, 1738, St. Petersburg, page 2, we find:

"Aiant comparé la situation du Kamschatka et des païs voisins, avec celle de la Chine, du roiaume de Corée, du Japon, et de la terre d'Yeco, qui m'étoit connue d'ailleurs, je me suis fait un sistème, & j'ai dressé l'an

1731, une carte de cette extremité orientale de l'Asie. J'ai marque aussi sur cette carte les dernières terres connues de l'Amerique, les plus voisines de cette partie septentrionale de l'Asie, afin de faire voir ce qui restoit encore d'inconnu entre-deux. On trouvera dans ce recueil une reduction de cette carte, avec le Mémoire que j'ai dressé dans ce temsla, & lu a l'Academie, dans lequel je rends raison de la construction de cette carte."

Only one volume of de l'Isle's essays appeared, so that the map and memoir promised in the introduction were never, so far as can be learned, published in their original form. The statements made by de l'Isle, however, unless definitely refuted, should be given full credit, seeing that the work was published by the Academy of Sciences at St. Petersburg, to which the map and memoir were presented, as is claimed, only seven years earlier. A doubt does, however, exist as to the date of the map made by de l'Isle. On this point Adelung, in his "History of Northeastern Voyages," Halle, 1768, page 569, evidently quoting from Müller, says:

"On the 17th of April, 1732, the order was, therefore, sent from the privy Cabinet to the Senate, which thereupon inquired of the Academy of Sciences of St. Petersburg what and how much had as yet been found out about Kamschatka, the surrounding countries and waters. The Academy confided the making of the report to Mr. Delisle, who prepared a chart upon which Kamschatka, Jeso, according to the description of the crew upon the Castricom, the Staten island, Company island, and the coast of Gama were designated. This chart was supplemented by a memoir in which he described the discoveries already made and suggested various routes for making new ones. He expressed himself in regard to those routes in the following manner: 'If one have attained the northern boundary of Asia, and at the same time the eastern limits, as far as Captain Bering went on his first voyage, one cannot fail to arrive in America, and might even choose the route, either northeast or southeast, whichever he prefers, as he would have, at most, only 600 miles to pass over. 2. Or, without venturing so far, it would perhaps be better and more comfortable to sail from the east coast of Kamschatka, go directly east, to look for the neighboring country which Bering found traces of in his first voyage. 3. Finally, he thought that if they should sail southeast from Kamschatka they would perhaps more speedily and more certainly discover the country seen by Juan de Gama.'"

Can the inconsistency between the dates, as given by Müller and Adelung on the one hand, and by de l'Isle on the other, be reconciled, or is it apparent rather than real? As Bering, according to the Russian marine officer (Waxel?) returned to St. Petersburg on March 1, 1730, it is reasonable to suppose that de l'Isle,

whose duties were those of a cartographer, had finished within the next year and a half his reproduction of Bering's working chart. The fact that the order of inquiry about the results of the voyage did not leave the privy council until April 17, 1732, does not necessarily indicate that the map at least, if not the memoir, was not already prepared, even if not in possession of the Academy of Sciences. It appears probable that the map may have been drawn by de l'Isle in 1731, but it is quite certain that it was not made public until 1732.

Lauridsen speaks of a map in Moscow in 1731, and, as it is evident from "Lettre d'un" that there was no difficulty in persons of influence procuring copies from the Senate, it is likely that the Moscow chart was a copy of the map of de l'Isle, and that the date of 1731 is correct; but this theory must rest on Lauridsen producing evidence that such a map existed in Moscow in 1731.

The Russian officer speaks with authority as to the map of 1732. Commenting on de l'Isle's account of the circumstances under which he compiled the map of 1732, he continues as follows:

"The Empress Anne having directed her Senate to give instructions to M. Bering for the second voyage, that body believed that it could not act with success unless it obtained from the Academy the fullest information relative to the situation of the lands and seas to be traversed. Therefore the Academy was so ordered by the Senate, which enjoined on M. de l'Isle the construction of the map of which I speak, and, for a clearer understanding, an explanatory memoir; which being done, both map and memoir were presented to the Academy by the Senate. Consequently, there is no reason to doubt that, far from exciting the Russians to new discoveries, far from being the cause of Bering's second voyage, M. de l'Isle only worked under specific orders. It is quite another question whether or not the memoir contributed to the success of the expedition, which I will discuss later. However that may be, the Senate gave a copy of it, as well as of the map, to M. Bering. I took a second copy of the memoir, which enabled me to compare it with what M. de l'Isle has now said to us of it in his later memoir of Paris."

These and other statements confirm those of de l'Isle as to the date of the map, in which year d'Anville engraved it (1732, or 1731 at the earliest), and likewise indicate that copies of both map and memoir were obtainable without great difficulty.

An interesting note as to the authenticity and origin of the

chart of d'Anville, 1737, appears in the narrative of Adelung, who speaks with a certain air of authority. He says :

"These Beering maps were, after the captain's return, sent from Russia to the King of Poland, who presented them to Mr. du Halde or, rather, to Mr. d'Anville, who made the charts for his work. Du Halde is therefore very correctly informed when he, in the Mémoires de Trevoux (737 pages, 2,389 f.) considers these charts questionable and imagines that they were merely made by d'Anville from Beering's journal."

But further evidence from an unquestionable source is available as to date. The charts in du Halde's "China" were engraved between the years 1729 and 1734, and all but the general maps were completed prior to 1733. The date 1732 is assigned by d'Anville's colleague to the map of Bering's journey. Of these maps it is further said :

"They form what is commonly known as d'Anville's Atlas of China. Nevertheless this geographer did not participate equally in the production of all. The detailed maps (of which the Bering map is one) were furnished by the Jesuits and he only supervised the engraving, but the general charts were entirely the work of d'Anville, who reconstructed and amplified them from all possible sources. They were reproduced at Hague under the title 'New Atlas of China,' etc., by M. d'Anville."

These statements of d'Anville's colleague, M. Barbie du Bocage, are thus verified by du Halde, page lxix :

"Pour les Cartes Générales, nous y avons peu touché & celle du Voyage du Capitaine Beerings paroit sans le moindre changement."

In the Russian atlas, 1745, the explanatory text regarding map 19, whereon appears the extreme northeastern coast of Siberia and the greater part of Kamshatka, runs as follows :

"We have determined the location of these provinces in part by astronomical observations which have been made there, and in part upon certain geographical and hydrographic maps which have been transmitted to us."

So far as Kamshatka and the Bering strait regions go, it is reasonable to believe that this chart, since it was published by the Royal Academy of Sciences, is substantially a reproduction of the map transmitted to the Academy by de l'Isle in 1732, especially as this geographer was employed for about thirteen years in amassing data for the atlas in question.

The writer has very carefully compared the chart of Kamshatka and adjoining regions as published in d'Anville's atlas of 1736, in the Russian atlas of 1745, and in the de l'Isle chart of 1752. From comparisons he is led to believe that these maps have substantially the same basis—that is, the chart prepared by de l'Isle in 1732 for the Academy of Sciences, St. Petersburg. In this connection the criticism of the Russian officer is significant. He says: "I will now finish with a general observation about the part of Siberia that we see on M. de l'Isle's chart (1752). It is simply a copy of the Russian atlas (1745), without even corrections of the errors of drawing and writing which have crept into that work." Elsewhere he adds: "We can correct the error of M. de l'Isle, who places Bering island at 54 degrees, only a short distance from Avatscha, whereas it is on the 56th parallel, 60 miles off Avatscha and 40 Dutch miles from the mouth of the Kamschatka river."

It is worthy of note that on Bellin's map of 1749(?) Bering island is crossed by the 56th parallel of latitude, and that along the southern edge of the Arctic ocean is a route track, marked "Voyage fait par Mer en 1648 par 3 vaisseaux Russiens dont un est parvenu a la Kamtschatka." On de l'Isle's chart of 1752 also appears the route of 1648, but Bering island is in latitude 54°. As to the position of Bering isle, the truth, as the Wise Man tells us is oft the case, abides between the two, as the 55th parallel intersects the land in question. At Cape Shelagskoi, d'Anville, 1737, the Russian atlas of 1745 and the de l'Isle of 1752 agree in charting four islands northeast of the cape instead of two islands to the west. This indicates a common origin to the charts, and where else can it be ascribed than to the de l'Isle map of 1732? The Russian officer, however, gives a clue as to the date when work on the map was commenced. He says:

"At that time I visited M. de l'Isle. I was a witness of his geographical labors as far as they had new discoveries for their object. I acted as interpreter to M. Bering in the conversations which he had with him; and I can assert positively that when M. de l'Isle began that chart the second expedition was already ordered, and Captain Bering, knowing what was still wanting to his discoveries, offered to continue them and his lieutenants with him, and they received promotion in consequence."

Lauridsen says:

"On January 5, 1732, the Senate gave him leave of absence to go to St. Petersburg. * * * Almost simultaneously he was promoted, in regular

succession, to the position of captain-commander in the Russian fleet, the next position below that of rear-admiral."

This indicates that the expedition was decided on at least as early as January 5, 1732; possibly earlier. Fortunately we are not left to inference, for elsewhere the Russian officer says:

"Mr. de l'Isle 'throws discredit on our discoveries by leaving on his chart the fictitious land of Gama, which, in order to avoid conflicting with our accounts, he places (in 1752) a little more to the west and south than he did on his chart of 1732.'"

This definitely fixes the year in which de l'Isle presented the map to the Senate.

We learn, however, from Lauridsen that "as early as April 17 (1732) the Empress ordered that Bering's proposition should be executed, and charged the Senate to take the necessary steps for that purpose. * * * On May 2 it [*i. e.*, the Senate] promulgated two ukases, in which it declared the objects of the expedition and sought to indicate the necessary means." It is very improbable that, in the case of so dilatory a man as de l'Isle, this chart could have been elaborated and drawn, the memoir written, a report made by the Academy to the Senate, and action be taken in the fifteen days which elapsed between the order for the chart and Bering's instructions. It is possible that the chart was drawn at the end of 1731, and that de l'Isle, for obvious reasons, gave it the earliest possible date.

In giving an account of Bering's provisions, as Dall says, every historian has followed a mutilated, if not garbled, paragraph from Bering's original report. The excerpts from Brooke's translation of du Halde, which was followed in Campbell's edition of Harris' Voyages, are as follows:

"The provisions consisted of carrots for want of corn [= grain or wheat], the fat of fish, uncured, served instead of butter, and salt fish supplied the place of all other meats."

"Fish oil was his butter and dried fish his beef and pork. Salt he was obliged to get from the sea; * * * he distilled spirits from 'sweet straw.'"

It appears from Bering's own journal, as well as from du Halde's account, that in 1727 Bering ordered one of his officers to endeavor to "deliver to the command at Kamschatka some part of the provisions, iron, and tar." Bering himself said that he was obliged to use tar made from the native spruce, "since

the tar which we should have brought with us had not arrived." This is confirmed by the additional note in du Halde, which says that the provisions, iron, pitch, and tar did not arrive till 1728, conveying the inference that it came too late to be of service. Bering appears to have had, on July 3, 1727, 2,300 poods of flour, equal to about 8,300 pounds, which would be less than a year's supply for his entire party. I cannot agree with Dall that Bering had plenty of flour or meal and meat.

I have said "From Bering's own report," because it seems incredible that du Halde did not have a transcript of Bering's report, since his narrative (du Halde's) follows almost word for word Dall's translation. It is not surprising that different transcripts should differ slightly on unimportant matters.

However this may be, it is evident that Brooke's translation of du Halde is careless. For instance, in Brooke's translation (edition London, 1736) of du Halde, on page 430, the number of Bering's party should be 33 instead of 30, and on page 440, where the voyage from Ochotsk to Takutski is given as from July 23 to October 2, the first-named date should be July 29.

Dall doubts that "carrots" were of Bering's provisions. Brooke omits the italicized words of du Halde's narrative (p. 567, la Haye, 1736): "Les provisions consistoient en carottes *et en racines.*" As indicated by context, the roots were radishes and turnips. The word "carottes" is explained by a passage in Grieve's Kamshatka as follows: "The morkovai poushki, or *carrot* bunches, are so called because they are like carrots in their leaf as well as in taste. They likewise eat this green in the spring, but they oftener sour it like sour crout or make a liquor with it." Doubtless Bering took these "carrot bunches" with him.

Another question which has engaged my attention is that concerning the lunar eclipses which Bering or his party is said to have observed in the winter 1728–'9. Dall says: "In none of the published reports of the expedition is any mention made by Bering or his officers of the occurrence or observation of an eclipse. * * * However, Middendorf states (Sib. Reise, iv. I, p. 56) that Bering and his lieutenants in the years 1728 and 1729 observed in Kamtschatka two eclipses of the moon, by which they corrected the longitude. He gives," says Dall, "no authority for this statement, and it is probable that an eclipse observed at Ilimsk, in middle Siberia, by Chirikoff is thus erroneously referred

to." Mr. Marcus Baker, in a paper appended to Dall's account, makes it evident that such eclipses, if any, were those of February 25 (local calendar), 1728, or February 24, 1729.

My own investigations confirm the statements of Middendorf, and in support of this I refer to de l'Isle and to the author of the "Letter." In this connection, however, we have the clear and definite statements of de l'Isle, both in his essays of 1738 at St. Petersburg and his memoir of 1752 at Paris. These statements are fully confirmed by the evidence of the Russian marine officer, who certainly served with Bering in his later expeditions if not in the first, and whose familiarity with all the records and papers should have enabled him definitely to contradict de l'Isle on the main question instead of correcting him in details. In his St. Petersburg memoirs of 1738 (page 10) de l'Isle writes:

"On verra a cette occasion la situation du Kamtchatka de terminée par deux eclipses de Lune, que M. le Capitaine Bering & ses gens y sont observées dans leur premier voyage [the expedition 1725–'30], & dont j'ai rendu compte a l'Academie aussi-tot que ces observations m'ont ete communiquées."

In the paper of Paris, 1752 ("Nouvelles découvertes au Nord de la Mer du Sud") de l'Isle says on this point:

"Captain Beering and his lieutenant likewise took observations at Kamschatka of two eclipses of the moon in the years 1728 and 1729, which helped me to chart the longitude of that eastern extremity of Asia with all the precision which the nature of these observations, made by seamen and with their own instruments, would admit of; but these first determinations have been since confirmed by observations on Jupiter's satellites, taken in that place with the utmost accuracy by my brother and some Russians conversant in this kind of observations and who were provided with the best of instruments."

It appeared to me possible that the report on the eclipses of the moon made by de l'Isle to the St. Petersburg Academy of Sciences might be traced up among the archives of that society. In searching for information on this point it was learned from Mr. O. Fassig, librarian of the Signal Office, that among the unpublished manuscripts in the Pulkova library, St. Petersburg, were a number by de l'Isle. A list of the manuscripts of M. de l'Isle was compiled and published in 1844 by the distinguished astronometer O. Struve, and among the number is one entitled: "Observations pour la longitude du Kamchat, d'ou se conclut aussi de Tobolsk. 1729, MSS."

It was reasonable, in view of de l'Isle's statements in 1738, to suppose that this is the report made to the Academy by him as soon as the observations were furnished him. I had hoped to present with this sketch definite information on this point, since a kinsman of the collator of the manuscripts (I refer to the very distinguished representative of Russia to the United States, M. de Struve) most courteously offered his valuable mediation in the matter. Unfortunately, I have as yet no further information, but I expect a communication as to the contents of the MSS. at an early day.

Criticising the memoir of de l'Isle of 1752, the Russian officer ridicules the author for speaking of Kamshatka as a town, but he adds:*

"It is certain likewise that M. Bering and his lieutenant, M. Tschirikow [quoting from de l'Isles Memoir of 1752], had, in the years 1728 and 1729, observed at Kamschatka two eclipses of the moon; but that by these observations M. de l'Isle was enabled to determine the longitude of this most eastern part of Asia, with such precision that the same had been confirmed in the second expedition, by precise observations of the satellites of Jupiter is what I cannot well conceive. Mr. de l'Isle himself intimates that Messieurs Bering and Tschirikow were not provided with astronomical instruments. They observed both these eclipses by the help, not of pendulums, but of their watches, without being able to know whether they went right or wrong; which makes it almost incredible that a determination based on these two eclipses should exactly agree with that deduced from the observations of Jupiter's satellites."

The officer, from his own account, served with Bering. In the introduction to "Une Lettre" he says:

"The orders of your Excellency [to whom the letter was addressed as written by his orders] will be complied with by me with more than one inspiring motive, and I shall not dwell on my unfitness, although I could find excellent pretexts for such an excuse, inasmuch as many of greater experience and equal application participated with me in the discoveries which resulted from the two voyages, called by us the Kamtschatkan expeditions. The only grounds on which preference could be shown me over them arise from my being charged, after my return from America, with the comparison of the journals of the various vessels together and with whatever was elsewhere to be found relative to lands situated in the South Sea, in order to therefrom construct a map which should accurately represent them all."

* "Une Lettre," Berlin, p. 19.

This officer, then, should be the very best authority on this question, especially as he gives details, is always exact in his dates, and sets no value on the observations. Whether or not such observations of lunar eclipses took place, these extracts tend to confirm Dall's opinion that they served no purpose in determining the longitude of Kamshatka.

The letter and its author are worth some attention at our hands. As has been said, it was published anonymously, and I do not know that its authorship has ever been traced. It appears from the letter that the writer was an officer of the Russian navy; that he was a Russian; that he was on familiar terms with both Bering and de l'Isle; that he acted as interpreter between them in 1730–1731; that he was with Bering in his last voyage to America, and was one of the ship-wrecked mariners on Bering island, and that on his return to St. Petersburg he was charged with the compilations from the various ship journals. As the naval officer states he was with Bering on Bering island, it is evident that it must have been either Swen Waxel, Sophron Chitrow, or Steller, the well-known scientific professor serving with Bering's expedition. It could not have been Steller, since the professor was a German, and moreover he died in November, 1746, prior to the date of the letter. It is improbable that it was Chitrow, who was originally in a subordinate position as a master-of-fleet, but while serving in Kamshatka and prior to Bering's second voyage was made a lieutenant. It is not likely that a subordinate of Chitrow's position should have been so situated in St. Petersburg as to have served as an interpreter between Bering and de l'Isle. It is therefore more than probable that Lieutenant Swen Waxel was the author of the letter. In further confirmation, this officer says that he is charged with the preparation of a chart out of the material furnished by the maps and journals of the separate vessels. As we know from other sources, Waxel later made a chart of the Kamschatka region.

Waxel displayed great energy and excellent judgment in conducting affairs on Bering island, both before and after Bering's death, and it is gratifying to note his intellectual discrimination in dealing with de l'Isle's fictitious account of a journey in America said to have been made by one Admiral de Fonte. Waxel skilfully dissects this geographical invention, clearly proving its inconsistencies, while geographical writers in England were engaged years later in endeavoring to prove its truthfulness.

It is significant that although Waxel omits any reference to it, the following paragraph, which is evidently intended to be exculpatory of Bering's turning back at the most northerly point of his first voyage, forms part of Bering's report as translated by Dall: "Neither from the Chukchi coast nor to the eastward could any extension of the land be observed." This very important sentence does not appear in du Halde's account, and evidently was not in the copy which was furnished him. Possibly the person who furnished the copy to du Halde omitted it. Elsewhere Waxel adds:

"I say nothing here which I have not repeatedly heard M. Bering say. I also saw his instructions."

This gives value to his statements in reference to Bering's efforts to find land east of Avatscha bay, whereof Waxel quotes de l'Isle as saying:

"On his return to Kamtschatka (in 1729) M. Bering learned that there was a land to the east, which could be seen in clear, fine weather. He attempted to go thither, after having repaired the damage his vessel had suffered in a storm. The second attempt was fruitless, for after sailing about forty leagues to the east without seeing land, he was assailed by a violent tempest and a contrary wind, which quickly drove him back to the port whence he had emerged."

In criticism Waxel adds:

"Would not this narrative lead one to believe that the second attempt of M. Bering had been made immediately after the first voyage [in 1729]? However, it was entirely otherwise: Before making this journey M. Bering wintered at Kamtschatka, set sail only on June 5, 1729, and, *without intending to return to the port which he was quitting*, doubled the southern point of Kamtschatka and went straight to the mouth of the river Bolschaia-Reka and thence to Ochozk."

He further says:

"Perhaps it may appear strange that M. Bering during this voyage did not fall in with the island (Bering island) whereon he was shipwrecked during his second expedition; but the isle might have been hidden by fogs, which are very common in that sea."

Waxel's account of the second voyage is worth translating, being the plain tale of a participant, who is as modest as he is truthful, for Waxel nowhere mentions his own name nor the

efficient service he rendered first to his chief and later to his shipwrecked comrades. He writes on "Une Lettre" as follows:

"Let us now come to the details of the second expedition, which M. de l'Isle pretends owes its origin to a map of *his* and was undertaken according to a memoir made by himself. 'I had the honor,' he says, 'in 1731 to present this chart to the Empress Anne and to the Senate, in order to stimulate the Russians to explorations of what still remained to be discovered, and it had its effect.' Was it time or age which caused M. de l'Isle to commit this error? Could he have forgotten the orders which led him to make the chart in question? Had he remembered it, perhaps he would not have said that he presented the chart to the Empress, and still less that he made it in order to excite the Russians to new discoveries. At that time I visited M. de l'Isle; I was a witness of his geographical labors, as far as they had new discoveries for their object; I acted as interpreter to M. Bering in the conversations which he had with him; and I can assert positively that when M. de l'Isle began that chart the second expedition was already ordered, and Captain Bering, knowing what was still wanting to his discoveries, offered to continue them and his lieutenants with him; and they each received promotion in consequence.

"It is therefore true that M. de l'Isle's work must be attributed to the orders of his superiors; and I remember that the Empress Anne having commissioned her secretary to give the necessary instructions to M. Bering for his new voyage, the latter did not think he could carry it on successfully without getting from the Academy all the information possible concerning the countries and waters where he was to navigate. The Academy was therefore called upon by the Senate, and it ordered M. de l'Isle to compile the chart of which I speak, and in order that it might be better understood, to explain it in a memoir; which having been done, the chart and the memoir were presented to the Senate by the Academy; so that there can be no possible doubt that, so far from having stimulated the Russians to new discoveries, so far from having occasioned the new voyage of M. Bering, M. de l'Isle only worked according to the orders he had received. There arises another question, as to whether the memoir caused the success of the expedition, which I will treat later on. However that may be, the Senate gave a copy of it to M. Bering as well as of the chart. I took a second copy, which enables me to compare it with what M. de l'Isle tells us about it in his last memoir from Paris.

"He pretends to have proposed three different routes to be followed in order to discover what was still unknown. The first, to sail straight to Japan, pass Yeco, or rather the straits which separate it from the island of the States and the land of the Company, to discover what is to the north of Yeco and search for the passage between that country and the coast of eastern Tartary. This is what is called giving advice after the event. In the original memoir there is not a word said about any such researches. M. de l'Isle contents himself with proposing three different routes for finding the countries lying near to Kamshatka on the east.

The first two, we must admit, agree well enough with the second and third routes mentioned in the Paris memoir. They are expressed in these terms:

"1. 'If one advances to the most northern extremity of Asia, and at the same time the most eastern point reached by Captain Bering (wrong supposition, as I have already remarked), one cannot fail to reach America, no matter what route one takes between the northeast and southeast, at a distance of not more than 600 leagues (great error in estimating the distance of the opposite lands of Asia and America, since they are only separated in the north by a narrow strait which widens as it goes south).

"2. Without going so far, it would perhaps be easier to start from the eastern coast of Kamshatka, sail directly east and reconnoitre the neighboring land, of which M. Bering discovered indications on his first voyage.'

"In regard to the third route, M. de l'Isle conjectures as follows:

"3. 'Perhaps the countries seen by Don Juan de Gama might be found more speedily and with more certitude by seeking them to the southeast of Kamshatka;' the outcome of which project showed him his mistake, which is apparently the reason that induced him to change it to that of the route by Japan and Yeco.

"Nothing is so imperfect in detail, and withal so dry, as the recital of M. Bering's voyage with which M. de l'Isle regales us. He makes him start in 1741 to look to the east of Kamshatka for the land which he had seen indications of in his first voyage. 'He did not go very far,' he says, 'for, being assailed by a violent storm during thick weather, he could not remain at sea, and brought up on a desert island in latitude 54°, only a short distance from the Port of Avatcha from whence he had sailed.'

"M. Bering, then, did nothing but fail, and he did so soon after leaving port. I must therefore supplement the meagreness of M. de l'Isle's relation by giving an account of the voyage of M. Bering and the other officers, chiefs of these expeditions, which will be so much the more easy as I took part in them and as I can, besides, refer to the charts and journals of each vessel as proofs of my correctness.

"The Captain Commanding Bering and Captains Spangenberg and Tschirikow, with several other naval officers, left St. Petersburg in the spring of 1733. They waited at Yakouzk and Ochozk until the vessels being built at this latter place for their expedition were completed, and when all was ready for the departure of M. de Spangenberg he was dispatched first, according to the orders of the Senate. He started, then, from Ochozk in the month of June, 1738, having three vessels under his command, to which he added a large covered row-boat of 24 oars, which he caused to be constructed at Bolscherezkoi Ostrog in Kamshatka, where he wintered. This boat was to be used to go into the narrow straits between the islands that they might find and where the ships could not go. In the summer of 1739 he went to Japan, the long chain of islands situated between Japan and Kamshatka serving to guide him. He landed at two different places in Japan and was received with great civility by the people of the country; but he never went to Matsmai, the principal place

on the island of Yeco, as M. de l'Isle erroneously states. He thought he had sufficiently complied with his instructions without doing so, and returning to Ochozk, passed the winter at Yakouzk. As soon as a detailed account of this voyage was seen in St. Petersburg they concluded by the route which M. Spangenberg had followed that he must have passed near the coast of Corea, and he was therefore ordered to make a second voyage in order to confirm the first. He started in 1741 and 1742, but his ship, built hastily and of unseasoned wood, leaked and obliged him to return.

"MM. Bering and Tschirikow left Ochozk the 4th of September, 1740. They both had the same destination; the second was to follow the track of the first. They only took different vessels so as to be able to assist each other more efficaciously in case of any accident. Without entering the Rolschaia-Reka river, as is customary in coming from Ochozk, they immediately rounded the southern point of Kamshatka and anchored at Avatscha, or port of St. Peter and St. Paul, as they called it. While wintering in these places, they made all their preparations for commencing in spring their principal voyage, which was to have America as its object. Owing, however, to the uncertainty as to the route which they were to follow, M. Bering assembled a naval council on the 4th of May, 1741, and it was resolved to endeavor first to discover the land of Don Juan de Gama, a fatal resolution which was the cause of all of our disasters. The 4th June we put to sea. M. Bering had on his vessel, sent by the Academy, an adjutant, M. Steller, physician by profession, but above all well versed in all that pertained to natural history. M. de la Croyere was with M. Tschirikow. Although M. Bering and M. Tschirikow were not to separate, according to their instructions, they could not avoid it, for eight days after sailing they were separated by storms and fogs. The search for the pretended land of Gama caused them to direct their course southeast; they continued to sail in that direction as far as the 46th degree without, however, finding the slightest vestige of it. They then changed their course to the northeast and both reached the coast of America, but in different places and without knowing of the whereabouts of the other. M. Bering and we who accompanied him saw land for the first time after being six weeks at sea. We then calculated that we were about five hundred Dutch leagues from Avatscha. We provided ourselves with fresh water. We saw indications of inhabitants, but could perceive no one. After being at anchor three days, M. Bering consulted with his officers, and it was resolved to return. The 21st July we weighed anchor before sunrise. There was nothing to do but to follow the coast, which stretched westward; but navigation was seriously embarrassed by frequent islands, and when we tried to put to sea we were met by storms and contrary winds, which caused us new delays every day. In order to procure fresh water, we returned towards the coast, from which we had kept as far as possible. Soon it was in sight, seeming about ten miles distant. We anchored between the islands, and the one where we landed was Schoumagin-Ostrow. The water was good, but although taken from a lake, there was, nevertheless, some sea water in it brought by the tide, which sometimes inundated the island. Afterwards

we felt disastrous effects from its use, in sickness and the loss of several of our men, who died. We tried in vain during three or four days to discover some natives of the country, whose fires we could see at night on the coast. The 4th of September these savages finally came, of themselves, in little canoes, and, having announced their arrival to us by a loud cry, they presented us with their calumets, in sign of peace. These calumets were sticks with the wings of falcons attached to the end. We understood from their gestures that they were inviting us to come on land in order to furnish us with provisions and fresh water. We wished to profit by the opportunity, and some of us ventured to follow them; but soon, however, misunderstandings arose and all communication was broken off.

"The 6th of September, after having at first had a tolerably good wind for the voyage, we began to find that as we advanced the obstacles were increasing, nothing but coasts and islands on every side. M. Bering wished to get away from them by sailing more southwards, and, in truth, for several days the sea appeared much more free. Our joy, however, was of short duration. The 24th of September, in latitude 54 degrees, we came upon coasts bordered with a number of islands, and at the same time a violent tempest arose, which lasted seventeen days and sent us back a distance of eighty miles. An old pilot acknowledged that during the fifty years that he had followed the sea he had never seen such a storm. We should then stop calling this ocean "Pacific." This name may, perhaps, be suitable to it in the tropics, but certainly is wrongly given to it here. The weather became calm again, but our provisions were by this time considerably diminished and there was only about a third of our crew who remained well and serviceable after all the hardships to which they had been exposed. There was still more than half of our way to make, counting from the extreme point of our voyage in the East to Avatscha. In view of these facts, many of us were of opinion that it would be better to winter somewhere in America, rather than run the risk of encountering new dangers worse, perhaps, than those we had just escaped; and these counsels came near prevailing over those who were of opinion that we should make a supreme effort to reach Ayatscha, and that it would be time to think of seeking another refuge when we had lost all hope of succeeding in so doing. The month of October, however, was passed as fruitlessly as the preceding ones. The 30th of that month we came upon two islands, which seemed to us to bear some resemblance to the first two of those islands which stretch from the southern extremity of Kamshatka to Japan. Thereupon we directed our course northwards, and the 4th November, having observed the latitude, we found that we were under the 56th parallel. The 5th, however, finished our voyage. Wishing to sail to the west, we struck upon a desert island, where we had a good prospect of finishing our lives. Our vessel went to pieces upon one of those banks with which the island is surrounded, and we were not long in seeking land, which we fortunately reached with everything which we thought we should need. By a special dispensation of Providence, the winds and waves threw the remains of our vessel on shore; we gathered them to-

gether to try, with the aid of God, to put ourselves in a position to leave this sorry dwelling. The island where we now found ourselves was destitute of trees. We were, therefore, obliged to depend upon the wood that the sea brought us to build our cabins and warm ourselves. We gave to this desert place the name of Bering island, in honor of the chief of our expedition, and it was there that he died, on the 8th of December, of grief and sorrow at having to give up all hope of returning to Kamshatka. He refused to eat or drink, and disdained the shelter of our cabins; his advanced age could not rally under such a disaster. We young men kept our courage up, resisted with firmness all discouragement, made it a duty to still enjoy life and to make as much as we could out of our prison home. Before our arrival, Bering island was the refuge only of the inhabitants of the sea, who came there to breathe the air and deposit their young. We were, therefore, able at first to observe these creatures very closely without their taking fright. It was only after having seen several of their number fall before our guns that they fled at our approach. We killed a great number of them, as much to furnish us with food as for their skins. It was by these valuable spoils, splendid castor skins, that we were repaid in some measure for our sufferings.

"At the approach of spring the following year we built of the remains of our vessel, as we had intended, a large covered boat, furnished with anchors and sails and able to live at sea if not exposed to storms. In this boat we confided ourselves to the sea, trusting in Providence, the 17th of August, 1742, and after nine days at sea, with beautiful calm weather, we arrived safely at Avatscha on the 26th, giving thanks to the Almighty, who had delivered us from such great dangers, and imbued us with gratitude such as time can never efface.

"From this account we can correct the error of M. de l'Isle, who places Bering island at the 54th degree, only a short distance from Avatscha, whereas it is on the 56th parallel, sixty miles from Avatscha and forty Dutch miles from the mouth of the Kamshatka river.

"The voyage of M. Tschirikow, although attended with less fatigue and danger, was not less painful to him. His tender heart, which his profession of mariner had not rendered indifferent to the sufferings of others, was indeed sorely tried. After parting from M. Bering, sailing northwest, he came on the 15th of July to a country the shores of which were lined with rugged rocks, at the foot of which rolled a deep sea. He prudently refrained from approaching too near the shore, but at the end of three days sent the pilot, Abraham Dementiew, with a crew of ten men, to reconnoiter the country. Neither Dementiew nor any of those who accompanied him ever returned; and most sincerely was he mourned, and deservedly so, for he was young, good-looking, of an honorable family, steady and clever in his profession, and zealous in the service of his country. After waiting six days, M. Tschirikow sent the boatman, Sidor Sawelef, with three men, but they did not return any more than the others. While waiting for their return we constantly saw smoke on the shores, and the day after the departure of the boatman two men, in different boats, came from the spot where Dementiew and Sawelew had

landed. When they had approached near enough to be heard they began to call out, 'Agai, agai,' and then went back. M. Tschirikow did not know what to think of their conduct, and now, despairing of the return of his men and having no more boats to send on shore, he determined, on the 27th of July, to leave the place, follow the coast as much as possible, and then return to Kamshatka. M. de l'Isle, then, makes an addition of his own when he says that 'M. Tschirikow made many excursions into the country, during the month of August, while waiting for the return of his men.' To return to the truth, M. Tschirikow, in a distance of one hundred miles, never lost sight of land; he battled often with contrary winds, had much anxiety on account of the heavy fogs, and lost an anchor which he had put out, not far from the coast, in a moment of great danger. He was visited by twenty-one canoes, of tanned skins, each one containing a man; but this was all—for he was unable to converse with them. The scarcity of water and the scurvy carried off many of his men. Among the officers he lost two lieutenants—Lichatschew and Plautin, fine men and excellent mariners—who might have rendered good service had they lived. M. Tschirikow himself began to have the symptoms of disease, but good food and the air on land restored him to health. M. de la Croyere was not so fortunate; he appeared to have held his own until he was just at the point of death. His companions marveled at the good effects of the large quantities of brandy which he drank every day; but they soon saw that the only good it did him was to make him forget his sufferings. He died on the 10th of October, as they were entering the port of Avatscha, having dressed himself to go on shore and having celebrated his arrival by new excesses. We cannot ignore the important service rendered by M. de la Croyere to the expedition, when he recognized the Americans who came to M. Tschirikow as bearing great resemblance to the inhabitants of Canada, whom he had met while serving in that country seventeen years before coming to Russia, with the King of France's troops."

NOTE.—A pamphlet which has just come into my possession, entitled "Lettre de Monsieur d'Anville au R. P. Castel, Jesuit. Au sujet des Pays de Kamtchatka," etc (24mo, Paris, 1737), throws some light on the map of du Halde (1732), and definitely fixes the date and locality of the observation of the eclipse of the moon referred to by de l'Isle and the Russian officer, as well as later geographers.

D'Anville says: "The map of Bering's voyage is attributed to me. * * * The only part I had therein was to reduce it from the much larger original map, of which I had made a tracing by means of oiled paper. * * * I first learned of Bering's voyage by letters from de l'Isle, then in Russia; and finally an account of this voyage having been sent to R. P. du Halde by His Majesty Stanislas, King of Poland, it was placed in my hands.

"Likewise, both by a sheet of *astronomical observations made by Bering which came to me* later, and by the same letters of M. de l'Isle, I knew that the mouth of the river of Kamtchatka was found by astronomical determination to be in latitude 56° and some minutes.

"Bering in his navigation doubled the southern point of this continent [Kamshatka] in latitude 51° 10′, as is expressly noted in the sheet of *observations* which is now before me.

"But though the solution of the difficulty in the case of the Land of Jeco may be very simple and natural, yet it was not obvious to me, it may be said, for Bering's voyage and observations caused me to recur to this subject, and I can no longer doubt that the eastern coast of Tartary should be moved to the east as far as the maps of the Jesuits first indicated; for although M. de Strahlenberg in his excellent map of Siberia shows only 65° of longitude between Tobolsk and Okhotsk, and there are even less in de l'Isle's map of Tartary, yet Bering's map indicates that there are 74°.

"It was found that it (Ohkotz) is 25° off of the meridian of Peking, which the observations of P. Gaubil placed in 113° fifty-odd minutes from Paris, so that it closely approximates the 139° which we have found it to be from Bering's observations. This determination does not differ much from the result of some astronomical observations, which, as I learn from China, M. de l'Isle, now in Russia, contemplated using in order to ascertain approximately the longitude of Kamtchat. The observation upon which I place the most dependence, and which likewise gives the greatest difference, is of an eclipse of the moon of February 25, 1728, of which the end was observed on the west coast of Kamtshat in latitude 52° 46′ N., Sirius having an altitude of 19° 18′ to the west, wherefrom M. de l'Isle calculated that the true time answered to 6h. 52m. p. m.

"This eclipse, the end especially, fell throughout Europe in the daytime, but having been observed at Carthagena, West Indies, by D. Jean Herrera, where it ended at 3h. 34m. a. m., a difference of 8h. 42m. is deduced between the meridians of Carthagena and the coast of Kamtshat."

It is thus evident that Bering observed an eclipse of the moon in Kamshatka, and that the observations came into the hands of M. d'Anville.

A. W. G.

JANUARY 21, 1892.

HEIGHT AND POSITION OF MOUNT ST. ELIAS.

BY

ISRAEL C. RUSSELL.

(*Laid before the Board of Managers December* 11, 1891.)

The height and position of Mount St. Elias have been measured several times during the past century with varying results. The measurements made prior to 1891 have been summarized and discussed by W. H. Dall, of the U. S. Coast and Geodetic Survey.* The various results obtained are shown in the following table. With the exception of the position determined by Malaspina and the measurements of 1891, they are copied from Dall's report.

Height and Position of Mount St. Elias.

Date.	Authority.	Height.	Latitude.	Longitude.
1786	La Pérouse	12,672 feet.	60° 15′ 00″	140° 10′ 00″
1791	Malaspina	17,851 "	60 17 35	140 52 17
1794	Vancouver		60 22 30	140 39 00
1847	Russian Hydrographic Chart, 1378	17,850 "	60 21 00	141 00 00
1847	Tebenkof (Notes)	16,938 "	60 22 36	140 54 00
1849	Tebenkof (Chart VII)	16,938 "	60 21 30	140 54 00
	Bach. Can. Inseln.	16,758 "	60 17 30	140 51 00
1872	English Admiralty Chart 2172.	14,970 "	60 21 00	141 00 00
1874	U.S. Coast Survey	19,500 ± 400 "	60 20 45	141 00 12
1891	Nat. Geog. Soc. Ex.	18,100 ± 100 "	60 17 51	140 55 30

The position given by Malaspina is from a report on astronomical observations made during his voyage,† which places the mountain in longitude 134° 33′ 10″ west of Cadiz. Taking

*Rep. of the Superintendent of the U. S. Coast Survey for 1875, pp. 157–188.

† Memorias sobre las obversaciones astronomicas hechas por los navegantes Españoles en distintos lugares del globe; Por Don Josef Espinosa y Tello. Madrid, en la Imprente real, Ano de 1809: 2 vols., large 8°; vol. 1, pp. 57–60. My attention was directed to this work by Dr. Dall, who owns the only copy I have seen.

the longitude of Cadiz as 6° 19′ 07″ west of Greenwich, the figures given in the table are obtained.

The data from which the various determinations made previous to 1874 were obtained have not been published. The observations made by Messrs. Dall and Baker, of the U. S. Coast and Geodetic Survey, are published in full in the annual report of that Survey for 1875, already referred to. The observations made by myself last summer as a part of the work of an expedition sent to Mount St. Elias by the National Geographic Society and the U. S. Geological Survey, from which the height and position of the mountain have been computed, are as follows:

A base line 16,876 feet long was measured on the beach at Icy bay. The line, with the exception of section *C* to *D*, as shown below, was measured three times in sections of about 3,000 feet each. The distances given below in columns 1 and 2 were obtained with a 100-foot steel tape, and those given in column 3 with a 300-foot iron wire. These are rough measurements, made without the use of a plumb-bob and without taking account of temperature. The ground was quite smooth, with a rise of about five feet in the center; but section *C* to *D* was crossed by a stream channel about 300 feet broad and twenty feet deep. Throughout much of the distance the ground was covered with grass, which was only partially cleared away. The stations at the ends of the line were ten feet above high tide. The bearing of the line from the western base was S. 89° E., magnetic.

Measurements of Base Line.

	1.	2.	3.	Mean.
	Ft. in.	*Ft. in.*	*Ft. in.*	*Ft. in.*
Western base to station *A*	3,179 10	3,178 7	3,178 9	3,179 1
Station *A* to station *B*	2,355 2	2,354 1	2,354 2	2,354 6
Station *B* to station *C*	3,589 0	3,587 9	3,586 0	3,587 7
Station *C* to station *D*	Rejected.	2,609 2	2,609 5	2,609 3
Station *D* to eastern base	5,145 5	5,144 10	Not measured.	5,145 1
Length of base line				16,875 6

The measurements of angles were made with a gradienter reading by vernier to minutes. The error of the vertical arc was —3′, and remained constant during the observations.

Measurements of Angles at Western Base.

		Right vernier.	Left vernier.	Vertical angle.	Date.
1.	St. Elias.....	218° 35′	38° 35′	+5° 40′	1891, Aug. 14, 10 a. m.
	Eastern base...	317 6	137 7	.....	" " "
2.	St. Elias.....	218 34	38 37	+5 40	" " "
	Eastern base...	317 6	137 7	.....	" " "
3.	St. Elias.....	218 37	38 39	+5 40	" " "
	Eastern base...	317 6	137 8	.....	" " "
4.	St. Elias.....	261 41	81 43	+5 40	" " "
	Eastern base...	0 10	180 11	.....	" " "
5.	St. Elias.....	261 41	81 43	+5 40	" " "
	Eastern base...	0 10	180 10	.....	" " "
6.	St. Elias.....	50 15	230 15	+5 40	" " 6. p. m.
	Eastern base...	148 45	328 45	.....	" " "
7.	St. Elias.....	50 15	.....	.....	" " "
	Eastern base...	148 45	.....	.....	" " "
8.	St. Elias.....	181 5	1 5	+5 40	" " "
	Eastern base...	279 30	99 32	.....	" " "

Measurements of Angles at Eastern Base.

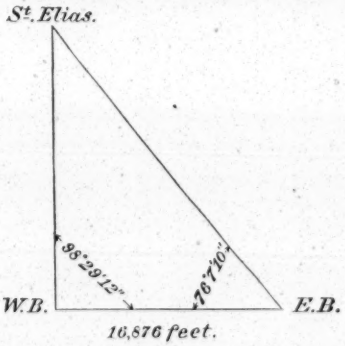
		Right vernier.	Left vernier.	Vertical angle.	Date.
1.	St. Elias.....	252° 26′	72° 27′	+5° 34′	1891, Aug. 17, 11.30 a. m.
	Western base..	176 19	356 19	.....	" " "
2.	St. Elias.....	252 26	72 26	+5 34	" " "
	Western base..	176 19	356 19	.....	" " "
3.	St. Elias.....	252 25	72 26	+5 34	" " "
	Western base..	176 19	356 19	.....	" " "
4.	St. Elias.....	252 26	72 27	+5 34	" " "
	Western base..	176 19	356 19	.....	" " "
5.	St. Elias.....	252 26	72 26	+5 34	" " "
	Western base..	176 19	.....	.....	" " "
6.	St. Elias.....	252 27	72 28	+5 34	" " 2 p. m.
	Western base..	176 20	356 20	.....	" " "
7.	St. Elias.....	252 28	.....	.....	" " 4.30 p. m.
	Western base..	176 21	.....	.....	" " "

From these observations the following angles between the base line and the line of sight to the summit of Mount St. Elias are obtained. The correction for error of vertical circle has been applied to the angles of elevation.

Resulting Angles.

	Western Base.			Eastern Base.		
	Right vernier.	Left vernier.	Corrected vertical angle.	Right vernier.	Left vernier.	Corrected vertical angle.
1	98° 31′	98° 32′	+5° 43′	1 76° 7′	76° 8′	+5° 37′
2	98 32	98 30	+5 43	2 76 7	76 7	+5 37
3	98 29	98 29	+5 43	3 76 6	76 7	+5 37
4	98 29	98 28	+5 43	4 76 7	76 8	+5 37
5	98 29	98 27	+5 43	5 76 7	.....	+5 37
6	98 30	98 30	+5 43	6 76 7	76 8	+5 37
7	98 30	.....	+5 43	7 76 7		
8	98 25	98 27	+5 43			
	98 29 22	98 29 00		76 6 51	76 7 36	
Mean.	98° 29′ 12″		+5° 43′	76° 7′ 10″		+5° 37′

The known elements of the triangle from which the distance of St. Elias from the ends of the base line may be determined are:



These data were sent from the field to the Secretary of the National Geographic Society, and, in connection with other measurements made at the same time, have been computed by

Mr. S. S. Gannett, of the United States Geological Survey. The results of the computation, so far as they relate to Mount St. Elias, are given below:

Computation of the Height of Mount St. Elias.

Station.	*Angle.*	16,876 *ft. log.*	
		Dist. E. base — W. base =	4.227270
St. Elias	5° 23′ 38″	A. C. log. sine =	1.026862
Western base	98 29 12	log. sine =	9.995218
Eastern base	76 07 10	log. sine =	9.987129
		St. Elias — W. base =	5.241261
		St. Elias — E. base =	5.249350

		log. feet.	*log. miles.*	*miles.*
Log. distance: St. Elias — W. base =		5.241261	1.518627	33.01
Log. tan angle of elevation 5° 43′ =		9.000465		
	1.7447 ft.	4.241726		
Curvature and refraction =	+ 623			
Western base above sea =	+ 10			
St. Elias above sea =	18080 ft.			

Correction for curvature and refraction in feet = $\frac{4}{7}$ sq. of dist. in miles.

log. distance miles =	1.51863
	1.51863
log. 4 =	0.60206
A. C. log. 7 =	9.15490
log. 623 ft. =	2.79422

		log. feet.	*log. miles.*	*miles.*
Log. distance; St. Elias — E. base =		5.249350	1.526716	33.63
Log. tan 5° 37′		8.992750	1.526716	
			0.602060	
	17462 =	4.242100	9.154902	
Curvature and refraction	+ 646			
E. base above sea =	+ 10	log. 646 ft. =	2.810394	
St. Elias above sea =	18118 ft.			

Mean elevation above sea level = 18099 ft.; or in round numbers 18,100 ft.

Mr. A. Lindenkohl, of the U. S. Coast and Geodetic Survey, and Mr. S. S. Gannett have each computed the geographic position of Mount St. Elias, using the azimuth and angle of elevation of the mountain obtained by the U. S. Coast Survey at Port Mulgrave in 1874,* and the elevation given above. From

* Report of the Superintendent of the U. S. Coast Survey for 1875. Appendix 10, pp. 157–188.

these data the approximate position of Mount St. Elias was found to be:

Lat., 60° 17′ 51″ N.
Long., 140° 55′ 30″ W.

The computation by which these results were obtained is given below:

Computation of Geographic Position of Mount St. Elias.

Azimuth: Port Mulgrave to Mount St. Elias =		142° 17′ 17″
Diff. azimuth		— 59 55
+ 180°	+ 180°	
Azimuth: Mount St. Elias to Port Mulgrave =		321° 17′ 22″

Latitude.		*Longitude.*	
59° 33′ 42″	= Port Mulgrave =	139° 46′ 16″	
+ 44 09	= Diff. lat.	+ 1 09 14	= Diff. long.
60° 17′ 51″	= Mount St. Elias =	140° 55′ 30″	

	1st Term. *Log. meters.*	2d Term.
Log. K = (Distance, Mulgrave–St. Elias) =	5.0183184	K^2 = 0.0366
Log. cosine azimuth, Z, 142° 17′ 17″ =	9.8982292	$Sine^2$ Z = 9.5731
Log. B =	8.5093902	Log. C = 1.6335
Log. 2666″.5 =	3.4259378	Log. 17″.6 = 1.2432
1st term = + 2666″.5		
2d term = — 17 .6		
Difference lat. = 2648″.9		

Log. K =	5.0183184
Log. sine azimuth =	9.7865328
Log. A* =	8.5086148
Arithmetical complement 60° 17′ 51″ =	0.3049593
Log. diff. in longitude 4153″.6 =	3.6184253

Log. diff. long. =	3.61843
Log. sine mean latitude 59° 55′ 46″ =	9.93722
Log. diff. azimuth — 3595″ =	3.55565

* *A*, *B* and *C* are terms depending on the size and figure of the earth and the latitude of the place.

The geographic position of Mount St. Elias is of popular interest in connection with the boundaries of Alaska.

In the convention between Great Britain and Russia,* wherein the boundaries of Alaska are supposed to be defined, it is stated that the boundary, beginning at the south, after leaving Portland channel, shall follow the summit of the mountains situated parallel to the coast as far as the 141st meridian, and from there northward the said meridian shall be the boundary to the Arctic ocean. Whenever the summit of the mountains between Portland channel and the 141st meridian "shall prove to be at the distance of more than ten marine leagues from the ocean, the limit between the British possessions and the line of coast which is to belong to Russia, above mentioned, shall be formed by a line parallel to the windings of the coast and which shall never exceed the distance of ten marine leagues therefrom."

As Mount St. Elias is approximately in longitude 140° 55′ 30″ west from Greenwich, as already shown, it is therefore only 4′ and 30″ of longitude or 2½ statute miles east of the boundary of the main portion of Alaska. Its distance from the nearest point on the coast is 33 statute miles. There is no coast range in southeastern Alaska parallel with the coast within the limits specified by the treaty, and the boundary must therefore be considered as a line parallel with the coast and ten marine leagues, or 34½ statute miles, inland. The mountain is thus one and one-half miles south of the boundary and within the territory of the United States. Its position is so near the junction of the boundary separating southeastern Alaska from the Northwest Territory with the 141st meridian that it is practically a corner monument of our national domain.

* Message from the President of the United States, transmitting Report on the boundary line between Alaska and British Columbia. 50th Congress, 2d session, Ex. Doc. No. 146, Senate, 1889.

THE HEART OF AFRICA.

BY

E. C. HORE.

(*Abstracts of two Lectures presented before the Society March* 6 *and March* 13, 1891.)

I.

The subject of Africa and its people has recently become a most interesting and popular one. We are but now beginning to realize the size and importance of Africa, as we are reminded that it contains nearly one-fourth part of the land area of the world; that it has mountains at least 1,000 feet higher than the most lofty American peaks; that the known extent of the Nile and the Congo now make them the rivals of the Yang-tse-Kiang and the Mississippi as the longest rivers in the world; that its central regions, instead of the great desert blank so long shown on our maps, is a rich and beautiful elevated region, having upon its heights a splendid collection of fresh-water lakes or inland seas, fertilizing by their outflowing streams the whole continent; and that it is known to contain over 250,000,000 people, or about one-seventh part of the world's population. It is called the "dark continent:" rather should it be called the "new world," in which our interest and responsibility—political, commercial and social—is rapidly growing.

For purposes of general description, there are three great divisions of the African continent and its peoples and affairs:

The northern division, stamped and characterized—men, manners and things—by the orientalism of its conquering settlers, so intimately blended by blood, religion and character with the natives as to have become essentially African, its original peoples so thoroughly influenced by the incoming foreigners as to be now essentially oriental;

The southern division, overrun in more modern times by foreigners of other races, and having its own peculiar civilization and characteristics due to that influx; and

Central Africa, including all that portion of the continent lying between, say, the Albert Nyanza and the river Zambesi, and Zanzibar and the Congo mouth, and which, although no part now remains of it that is not nominally the territory either of the Congo Free state or some European power, is still almost entirely in the possession and occupation of its lawful owners, the native uncivilized tribes.

As well as this transverse political division of Africa, we may make what may be called a concentric analysis. Commencing with the outer *skin*, the 16,000 miles of African coast, we find upon it certain excrescences, which, if our examination went but skin-deep, might well lead us to regard Africa not as a "new," but as an "old, old" world. On the north and east the remains of ancient civilizations, Morocco, Tangier, Egypt, remind us of Africa's bygone grandeur—remind us how very much of forms of beauty and secrets of science and art came to us in the birth of civilized Europe from or through Africa. On the south and west again, memorials of Phœnician, of Portuguese, of Dutch, English and American conquering visitors and adventurers remind us of the constant preying of the nations on the dark continent—remind us, through certain prison castles still to be seen on the western coast, of the great world's crime, the slave trade. But on the outer surface of Africa other signs are to be read: North, south, east and west there are ports and roadsteads forested with the masts of the world's shipping conveying to Africa's every shore those products of the civilized world which, according to their nature for good or harm, are to influence and civilize the Africans; carrying away from her shore the land's products—a constant stream, increasing perhaps just now, but which has always been flowing—of wool, cotton, oil, rich spices, dyes and medicinal and ornamental woods, india-rubber, gum-copal, ivory, precious stones, gold. Are these the products of a desert land inhabited only by a lazy and savage people?

Following our concentric analysis, the first layer behind the outer skin of Africa may be said to consist of a verdant slope, broad and luxuriant in the tropics, where nature herself has been lavish, narrower, but still ever widening, in the drier north and south, as the oriental and the European respectively advance their groves of fruit and fields of corn, maintained in luxuriance alike by the vapors of the sea and the down drainage from the higher lands, and from the same causes also malarious and un-

healthy. In another sense, too, this outer belt is both rich and unhappy. Into it come those men and things representing "civilization" from afar. To it, from the interior, gravitate those of the natives who are influenced by contact with those men and things, deprived to a great extent of the old uncivilized condition and its innocencies and partially imbued with what of civilization has come to them. Mankind, too, in this outer belt is often only too rank and unhealthy in his character. It is truly "darkest Africa;" for, first, the slave trade and then the rum bottle have in many parts been the preponderating representatives to them of outer civilization.

The next layer is a step or terrace of flat sandy semi-arid country, narrow in the tropics, widening toward each extreme, until it bulges out in the north into the Sahara desert, in the south into the Kalahari, some parts always bare and sandy or covered with a sparkling saline or alkaline deposit, some parts forming broad savannas or prairies, bearing rich grasses in the rains, burnt bare in the dry season; others covered with thickets of thorns or stunted and crippled trees under the same variations of seasons. This is the land of the ostrich and the pelican, the scene of vast prairie fires or whirling dust spouts; it is the land also of the nomad man. Across the Sahara the wandering Arab leads his camels from oasis to oasis; amid the wastes of the Kalahari the homeless Bushman finds a congenial hunting territory; in the narrow, tropical parts such semi-nomads as the Somali, the Wamasai, and the Wagogo lead their cattle from place to place, as the grass and water serve them with the seasons.

This terrace or flat sandy belt being crossed, we come to the true central region of Africa, a long irregular oval-shaped elevation of mountain masses, spreading out in many places as vast plateaus and forming altogether that mysterious elevated region reported from time to time by old investigators as well as compilers of native reports as the Mountains of the Moon. In the crevices of this central mass, in rocky basins, in fathomless chasms, in vast depressions of the plateaus, lie those great natural rain-water tanks known as the central African lakes. On and around it are the richest and most beautiful and healthful countries. Spreading over it and around its beautiful waters are the most intelligent and industrious of the native African tribes, their native industry and enterprise yet almost undisturbed by the

busy excitement of civilization. Hence there may fairly be drawn something like a sample of the real African native character and condition. They live in families; among them the family tie and the rights of property are regarded; conscience pronounces criminal and offensive the same irregularities as are so regarded among civilized peoples; in stature and physical condition they come up to the best standards. I argue that the life and condition which presents this state of things after isolation for thousands of years from all we call civilized can scarcely be called evil or degraded.

Among these people, both pastoral and agricultural, are to be found in progress the germs at least of all the useful arts—the procuring and working of both iron and copper, pottery-making, the spinning and weaving of cotton cloth, the very beautiful development of plaiting of all kinds of vegetal fibers into string, rope, mats, baskets and cloth; and where valuable materials and products are naturally confined to particular localities, as is the case sometimes with oil, salt, etc., it is manufactured and distributed. Too often are people described as lacking in industry who are not the same as ourselves; but it seems to me ridiculous that a man should be called lazy because he has ample leisure between his busy times, who has made with his own hands, from nature's absolutely raw material, his house, his axe and hoe and spear, his clothing and ornaments, his furniture, his corn mill, all things that he has, and who, though liable often in a lifetime to have to repeat that whole process over again, has the energy and enterprise to commence afresh. Too often have the same people been called savage and bloodthirsty who, through all experience and by all their traditions getting naturally to regard unintroduced armed strangers as enemies, have the same desperate energy to defend themselves and their own which, as displayed by our own ancestral relatives, we love to term patriotism and courage.

In a fairly central position on this great central elevation is the elongated basin surrounded by a mountain rim in the bottom of which, in a long chasm, lies Lake Tanganyika, in a position alike so central and so unique that I have termed it the Heart of Africa. Inside the mountain basin rim, the rainfall all converges into Tanganyika; outside, it all flows to the outer shores of the continent by the Nile, the Congo or the Zambesi. Fifteen years ago the waters of Lake Tanganyika, having very slowly

gained upon the evaporation (the then only means of carrying off its surplus) attained to the height of the lowest gap in its rim and commenced to flow out, and thence its surplus water ever since has found an exit and now forms part of the Congo system. Tanganyika is 400 miles long and from 15 to 50 miles in width, and is 2,700 feet above the sea.

To leave, however, this very rough general description of Africa at this point would convey a wrong idea. We have described the verdant slope from the coast, the terrace of flatter country, the central elevation and its heart; now we may imagine a series of great ridges and furrows and other radial features diverging from the heart of Africa to its very shores, besides certain isolated ridges and peaks, some of them snow-clad, and certain isolated depressions forming lakes or swamps; first the three great furrows of the Nile, Zambesi and Congo and the three great ridges formed by their dividing water-sheds, and so on through fan-like expansions of rim or ridges and furrows until the previously described concentric formation, although still there, is considerably cut up.

The great central mountain mass, buttressed by its far-stretching ridges, forms *the backbone*, from which, outward and downward, in intricate articulations, extends the complicated *bony skeleton* of Africa.

Set like sparkling jewels in its crevices and depressions, the great lakes send forth the streams which, flowing through gaps in their surrounding mountain barriers, rushing through narrow channels, oozing slowly through elevated flats or bounding in beautiful cascades over steep steps, and carrying the vitalizing fluid in every direction through the length and breadth of Africa, form *its system of circulation*.

Bordering the great lakes and clustering on the slopes, forests of gigantic trees form the *flesh and muscle* of this great creation; preserved in perpetual verdure wherever water constantly remains and in long extending lines and network fringing the ever-winding banks of the streams, and finally joining with the verdant belt of the sea-coast to form the brilliant *epidermis* of the whole, and forming background and filling to the network of these prominent features, in broad concentric curves and in belts and patches, the more stunted thorny growth, long grass, broad savanna and sandy plain, ever changing in color and aspect.

The great new and beautiful world of Africa lies open before

us; 250,000,000 intelligent and courageous people have become exposed to the influence, for good or evil, of the civilized races. What shall we do with it and them? Quite possible is it fairly and honestly so to explore and deal with both country and people as to develop its resources and benefit them, while adding to the world's treasury of comfort-bringing products and human brotherhood the riches and the friendship of a new continent; but it must be by peaceful and just measures and by honest trade with wholesome wares.

II.

As a practical way of leading you in imagination to the heart of Africa, and as indicating the circumstances and experience upon which my observations on Africa are based, I shall describe one of my many journeys.

In the year 1882 I had the honor to be leader of the largest European expedition that has yet entered Africa, having in it, for instance, 200 more men than the Emin Pasha relief expedition. There were ten Europeans, all told, who represented survey and navigation, medicine, carpentry, blacksmithing, and other specially selected talent for the purpose of exploration and civilization, as well as those specially devoted to the teaching of Christianity, which was the ultimate aim of all. We entered Africa from the village of Saadani, on the eastern coast, opposite Zanzibar, our destination being the shores of Lake Tanganyika at Ujiji.

To make not only our progress sure, but work and residence at our destination safe and possible in such a land, we had stores of groceries, medicines, tools and clothing, and a large quantity of calico and other cloth, which forms the currency of the country, for the purchase of supplies and payment of wages to porters, servants and workmen.

The special locality to be worked being the countries surrounding Lake Tanganyika, to which that extensive and beautiful inland sea gives access, we carried with us also, for its navigation, a sailing boat built of steel, of the form of a sea-going life-boat, and constructed in small sections and pieces for transport. This boat I designed myself. Six of the sections were to travel on

specially constructed light carts, drawn by African natives, and the rest, in small pieces, were to be carried by the porters in the ordinary way.

The mode of travel was walking, except when now and then an invalid was carried in a hammock. The method of transport was by means of native porters, hundreds of whom devote themselves to this work. They are paid $5 per month as wages, payable at Zanzibar on their return to the coast, less such advance in kind as they may draw from their leader along the road. In addition, they get a regular allowance of two yards of white calico per seven days, each man, as barter with which to obtain food.

The organization and start of such a party took some time, and parties of from 100 to 300 were dispatched along the road as things were ready, until, when I started with the final rear guard, we had on the road over 900 of these porters, with their headmen and petty officers, all under complete organization.

The first start of the boat-section carts was the scene of apparent disaster. The men, wild with excitement and uniting their shouts with those of onlookers, were beyond all restraint for the moment, and as they rounded a sharp turn to get out of the village of Saadani, over went the carts, one after the other, on their sides; and it was some time before I could train the men to steer more carefully or to move gently down a declivity. In time, however, the whole thing worked well. The fore compartment of the boat, going stem first, often forced its own way through masses of brush and creeper, helping to clear the way for the narrower sections, whose carts insinuated themselves through surprisingly small gaps. The men themselves were most zealous in the service, and as we emerged from lengthy stretches of jungle, ascended steep river banks, or jolted whole days over rugged stony places unharmed, we made up our minds that these carts would "go anywhere." In twenty days we reached Upwapwa, 200 miles from the coast, and joined an advance party awaiting us; and after a few days' rest and reorganization, we started once more westward.

The first village beyond, in the country of Ugogo, was thirty miles off. The first day was a comparatively easy march to a watering place, but the next two days gave us tough work. The thick, tangled, thorny scrub became quite dense, and for those two days we had to cut our way through it foot by foot. Hour

after hour the twang of the sword-bayonets and the thud of the axes were almost the only sounds to be heard till the train of carts moved slowly on as the way was opened. Toward evening of the second day we followed a narrow pass along the side of a rocky river bed, stout, inflexible trunks and branches here projecting into our path. On some of these ebony bars the axes resounded as on an anvil, and they yielded only to the more patient saw. As the sun descended we began to flag, but help was at hand; for a party coming back to us from the camp ahead with food and water, we picked up strength and spirit and reached camp late in the evening.

The level plains of Ugogo, which here represent the flat, open step or terrace to which I have referred in the general description of Africa, enabled us to make a week or so of splendid and comfortable marches. Ugogo passed, there lay before us the much-dreaded wilderness, so-called, of the Magunda-Mkali, separated from Ugogo by a steep, rocky ascent, which we could only tackle one cart at a time, and we soon came to a point so rugged with broken rocks that we could proceed no further; but the sections were unlashed, the carts taken to pieces, and all handed or dragged across the difficult place and put together again beyond. Over the scrubby, rugged hill and dale of Magunda-Mkali, without inhabitants, 20 to 25 miles a day was often made; every man knew the necessity of pushing on for food and water, and the danger, from wild beasts or wandering highwaymen, of lagging in the rear.

On, on, went the novel train, through weary miles of forest, across the scorched plain, rattling over the hard sun-baked footprints of the elephant and rhinoceros; on through grassy glades where the nimble antelope bounded, scared out of our path, and the zebra and giraffe were startled by the rattling of these strange disturbers of their solitude; on still through miles of swamp, with its croaking legions; on through scenes of surpassing beauty, bright flowers and gleaming birds and butterflies; on past the bleaching bones of other travelers waylaid or exhausted, till the sun creeps up high overhead and eager glances are cast at green spots where water once had been; on, till the pace grows slow with weariness and thirst, and still on, till it revives again as the welcome messenger from the front appears in sight with water or the camp-fires tell of food and rest.

Completing this difficult section of the journey and mounting

to the beautiful forests and numerous villages of Unyamwesi, we had arrived upon the central heights of the continent, which everything around us bespoke its best part; the clearer, more healthy air, the rich land, the open forests, the numerous and industrious people, all spoke eloquently of a better and brighter state of things in the interior of Africa than on its outside.

At Urambo we elicited the pleased surprise of our friend, the famous chief Mirambo. Said Mirambo, laying his hand emphatically on one of the boat sections, "This boat and these carts are mine, and all Unyamwesi is yours." It was his way of expressing sympathy and admiration of what he considered to be a very wonderful enterprise, and we left him pondering more deeply than ever on the doings of the "white men."

The rains were now at hand and the country rich and verdant; we hastened on with all speed possible to enable us to cross the Malagarasi river before it should be too swollen. Emerging from elevated forest land to a view of the valley of the river, it appears like a vast level expanse of harmless grass, but the swift river is flowing in the bottom. The toll required by the natives being paid, we descended to the river through the thick grass. We crossed the river in tiny dug-out or bark canoes managed by the natives. One old man, a leader among these ferrymen, we had especial cause to notice; we called him "the old admiral." He wore a curious skull cap apparently made of bladder, and presented a most odd appearance. To him we paid a special fee of propitiation for the boatmen. As we proceeded down toward the river the first sign of it among the long grass was quiet shallow water on the path; this grew deeper and deeper as we walked on until we were immersed to the armpits, the grass rising avenue-like overhead. We emerged upon a small island or rising ground, and the river proper was before us. On this little eminence stood "the old admiral" superintending all. The porters and their ordinary loads all crossed in the usual way, two or three at a time in the little canoes. The two large carts, with the bow and stern compartments of the boats, were floated along the watery avenue by the buoyancy of their tank-like loads; the others came, sections and carts, separately. The fare for each load was one yard of calico, but when the carts appeared there was general astonishment among the ferrymen, who showed signs of clearing off altogether; "the old admiral" alone was unmoved; his stolid countenance showed no sign, but a deep bass growl,

"Eight yards, eight yards for these!" expressed at once his nonchalance and his determination; and eight yards we had to pay. All was safely got over in a day. Two of the bark canoes were lashed together with poles across, and one section or one cart at a time laid on top, and thus all was carried across.

Obstacles which further back would have been regarded as great hindrances were now made little of; success seemed assured to all, and the men even began to rehearse their triumphal entry into Ujiji. One more difficult river, the Lusugi, we had to cross. We reached its banks, down a rocky descent, late one night in a heavy fall of rain. We waited an hour or two next morning till the river had somewhat subsided, and then commenced work. Two or three volunteers swam across with a stout rope, which was then hauled tight across the stream. The porters, holding this rope in one hand, slowly but surely made their way across. Then the carts and sections were attached to a block running on the rope, and so, carefully attended by two or three men, were floated over in safety.

Ujiji was now only a few marches ahead. The view of the lake was caught at last, a narrow strip of its waters gleaming in the sun in the distance, and next morning we slowly marched into Ujiji in a compact body. The boat was duly launched and has now been for years at work on Lake Tanganyika in the cause of civilization and Christianity.

The *completion* of this journey, however, was but the *commencement* of a still larger enterprise in the region reached. Stations were established among the tribes on the lake shores; a larger vessel, with steam power, was built and launched on the lake, and a substantial mission was established and is still at work at a point which is only 400 miles from that point on the Congo river accessible to the steamers of the missions there.

All the work I have described was done at the expense of the London Missionary Society.

REPORT OF COMMITTEE ON EXPLORATION IN ALASKA.

(*Accepted April 3, 1891.*)

Washington, D. C., April 3, 1891.

To the Board of Managers of the National Geographic Society,

Washington, D. C.

Gentlemen: Your Committee, instructed "to consider the advisability of further Alaskan exploration by the Society this year and if deemed advisable, to consider and report upon ways and means for accomplishing it," respectfully submit the following report:

The general question of desirability has been decided affirmatively by the Board of Managers; it therefore is inferred that the question of advisability may be taken as involved in that of ways and means.

In outlining a plan of work, concerning which such inquiry is to be made, it has been found necessary, in the lack of formulated opinion by the Society, to make assumptions as to what should be its purpose and policy in undertaking exploration. It is assumed tentatively that in order best to further the object for which the Society is organized, namely, "the increase and diffusion of geographic knowledge," the aim in exploration should be not so much to promote the growth of science as to diffuse a general interest in geographic work in its several departments, and, adhering to the principle of attractiveness, to increase the sum of knowledge by discovery and by the addition of general and elementary facts rather than by detailed investigation, for appreciation of which scientific training must be presupposed. It is furthermore believed that the policy of the Society should be to invite coöperation, offering opportunity at the same time for special study in related sciences; to effect the organization and devise the plan, and itself to take part directly in field work only so far as may be necessary to initiate and promote it.

Your Committee find that apparently it will be practicable,

with coöperation, for the Society to extend this year the exploration work of last year in the vicinity of Mount St. Elias. Specifically it is recommended that the plan be to determine directly, from a long base line near the coast, the height of the mountain, to ascend it, to observe systematically the unique phenomena of physical geography of the Malaspina glacier from Icy bay to the initial point of last year's exploration, and to explore the Seward glacier to its head if deemed advisable after the ascent of the peak.

In view of the fact that it is the purpose of the Coast and Geodetic Survey to carry the international boundary survey into this region within one or two years, it is considered inexpedient for the Society to undertake extended topographic work. It is, however, submitted, as a principle which this Society should emphasize in projecting exploration, that facts of physical geography have minimum value and may lead to false conclusions unless correlated through their space relations; and it is recommended that the expedition aim always to employ such means as may be practicable for making record of its course and of its observations in approximate geometric relation to surroundings.

Conditional offers of coöperation have been made by the Revenue Marine Service, the Geological Survey, the Coast and Geodetic Survey, and the Century Company of New York. Transportation from Seattle to Alaska and return, it is thought, may be secured on the steamer Corwin, and that vessel's commander, Captain Hooper, has expressed a desire to extend his coast-line exploration of last year by making a survey of Disenchantment bay. The Geological Survey offers to detail Mr. Russell to conduct the expedition, and to bear the expense of a number of field hands and of their equipment. The Coast and Geodetic Survey has expressed a desire to aid, if practicable, by beginning boundary work in the same field this year, and incidentally to do other surveying with special relation to the work of the expedition. The Century Company offers to send an artist experienced in Alpine work and to pay the greater portion of his expenses. The opportunity for study of the fauna and flora of the region it is thought should not be neglected.

The cost to the Society, wholly in items of field expense otherwise unprovided for, which may be considered as the cost of enabling the combination to work as one organization, is estimated at $500.

The expedition should leave Seattle in the latter part of May, aiming to reach Icy bay by the first of June, and field work should close by the end of September.

Your committee consider further exploration in Alaska by the Society this year as practicable, and recommend that the proposed expedition be authorized, and that Mr. Russell be at once invited to organize and conduct it, under the auspices of the Society.

Very respectfully,

G. K. GILBERT.
EVERETT HAYDEN,
WILLARD D. JOHNSON,
Committee on Exploration.

NOTES.

La Carte de France, dite de l'Etat Major, par M. J. Collet. Paris, 1887. 8vo, pp. 92, with 4 plates.—This pamphlet describes the great "Staff Map" of France, recently completed, giving its history, the methods employed in the field and office work, the contents of the map, and the means of representing the various features therein described. The scale of the map is 1:80,000. Relief is represented by hachures, for drawing which approximate contour lines have been located, but these are not otherwise used. A great variety of cultural features are shown, many of which are ephemeral, and which contribute to the overloading of the map with details. Moreover, as the time which has ordinarily elapsed between the survey and the issuance of the work in printed form is ten or twelve years, most of this culture has become not only of no value but misleading by the time it is published.

The account of the organization and methods by which the map has been produced is of special interest. The primary triangulation upon which it is based is one of the most elaborate and accurate ever executed in any country. No expense has been spared in this direction. Within this triangulation is a secondary triangulation, also very elaborate, from the stations of which numerous additional points are cut in, or located by unclosed triangles. All this work is of the highest order of excellence, being infinitely more accurate than the map requires

With this, however, the accuracy appears to end. The detail consists of the map, or the map proper, little more than a compilation of commune cadastral plans. These were fitted to the triangulation points and to one another, a process which appears to have been by no means easy of satisfactory accomplishment. This adjustment having been completed, the culture was brought up to date of survey and a survey was made of the relief features by the use of such inferior instruments as the clinometer compass and chain.

The principal and obvious criticism upon such work is that it is top-heavy. The triangulation is far more elaborate than is required, while the provision for making the map itself is by no means comparable with it: it is as far below the requirements of the scale as the triangulation is above it.

This leads up to a broader proposition, which may be stated thus: That the general tendency of surveying organizations is in the direction illustrated by that of the "French Staff." Organized originally for map-making, they progress little by little in the direction of devoting their energies to geodetic work, while at the same time the topographic work proper, for which they were created, is belittled and neglected. As a consequence the latter depreciates in quality and diminishes in quantity; the main purpose of the organization is lost, and a mere means becomes the ultimate end of the work. This tendency should be recognized in map-making organizations. The weakness of our modern maps is seldom in the primary control. It is easy to do triangulation of sufficient accuracy for the control of maps upon such scales as that above considered, little knowledge or experience being required beyond that gained at our engineering schools; while the more accurate triangulation, generally known as geodetic work, requires merely better instruments, more time, and more experienced observers.

The weak features of maps are generally the details, the part of the work that, strange to say, is usually relegated to the lowest grade of professional men. This weakness consists in an insufficiency of minor locations for the control of the sketch and in unfaithful sketching. It is the sketching that requires the most careful attention and the best and most experienced men. The instrumental portion of the work is the least difficult; the artistic portion, or sketching, is the most difficult. It would seem more logical and would doubtless produce better results to reverse the

usual order of promotion and place the topographer above the triangulator. Moreover, the triangulation should be regarded as merely a means for the correction of the sketching, and it should be required only that it be of sufficiently high grade to meet this condition. The minor locations should be sufficiently numerous and well distributed to fully control and correct the sketching; and finally the sketching should be as faithful a representation of the topography as is consistent with the necessary generalization of the surface features.

H. G.

Polar Regions.—The *Societe de Geographie* of Paris in its Proceedings publishes the following communication from M. Ch. Rabot on the new Danish expedition engaged in the exploration of the eastern coast of Greenland, under the command of Lieutenant Ryder, of the royal Danish navy. The expedition has in view the examination of the unknown coast between Franz-Josef fiord, in latitude 73°, and the most northerly point reached by Commander Holm and Lieutenant Garde, about latitude 66°. Lieutenant Ryder left Copenhagen June 7, 1891, in the Norwegian whaler *Hekla*, which had been chartered by the Danish government. The first ice was met on the 20th, in latitude 68° 12′, longitude 13° 05′ west. Unable to pass through the pack to the Greenland shore after several attempts, the ship proceeded northward, and in the vicinity of Jan Mayen made soundings and successful dredgings. Several attempts to reach the coast of Greenland were made from the 75th parallel southward, but without success up to July 2, when the *Hekla* was in latitude 71° 31′, longitude 6° 30′ west. Since that date there has been no direct news, but on July 26, in latitude 72° 40′, longitude 14° 25′ west, the English whaler *Active* saw the *Hekla* a few miles to the northeast, heading to the south-southwest. On August 2 the *Active*, in latitude 71° 40′, approached within 12 miles of the coast, and on August 20, in 70° 30′, was within 7 miles of the mainland. In both instances the intervening sea was free of ice. The English captain believes that the *Hekla* made the eastern coast in about 71° 30′. The *Hekla* is provisioned for the winter, and there is a prospect of marked success by the Danish officers in their undertaking.

The Crossing of Tibet.—The explorations of Mr. Rockhill in Tibet and his renewed attempt to reach Lassa, the "holy city" of that country, creates an unusual interest for Americans in the account of the crossing of Tibet by M. G. Bonvalot, Prince Henri d'Orleans, and P. Dedeken, published in the last Bulletin of the Paris Geographical Society.

Six days' journey from Moscow brought the party through Russia and Turkestan to Kouldja (45° N., 41° W.), in extreme western Mongolia. Having obtained authority from the Chinese governor of the province to proceed, the party, aggregating 15 in number, left that place September 12, 1889, with Batang, China, as an objective point. On October 5, after a journey of about 450 miles, during which they crossed the Thian-chan ("heavenly") mountains by Narat pass, they camped at Korla, near Bagratch-koul. Here they were warned that they could proceed no farther, and the governor of Ili sent an order to arrest them. The mandarin and other local authorities did not, however, actively oppose their departure, which took place during the night of October 10, the party then consisting of 20 horsemen and 40 pack-animals. On October 28 they reached Kara-douran, the western end of Lob-nor. A side trip by d'Orleans and Dedeken to Lob-nor proved it to be no longer a lake but a series of swamps and sandy islands, with the water nowhere more than four feet deep. Meantime Bonavolot accumulated supplies and replaced from the hardy Mongols the more timid among their camp-followers, the party being reduced to seven, with a few extra men for a short distance.

Quitting Tcharkalik on November 17, they followed the route taken by Carey; but on the advice of the natives they resolved after crossing the Altyn-tagh to go directly southward instead of turning eastward, and thus to attempt a new route, on which they were beset by the usual physical discomforts attendant on travel at great elevations. On these mountain ranges they saw only wild sheep, blue hares, wild horses, crows and partridges. On December 5, just south of a large salt lake (Ouzoun-tchour), they saw a caravan of Kalmouk pilgrims returning from Lassa by an unknown route, which they refused to make known, and decided to temporarily abandon their idea of reaching Batang and instead to go direct to Lassa by retracing the caravan trail. From this point (about 38° 30′ N. and 87° 30′ W.) they proceeded directly southward. The region penetrated was unknown, the winds

violent the entire day, the desert treeless and without water, the route lined with the carcasses of camels and their drivers, the only fuel the dung of wandering yaks or caravan camels, and the trail so indistinct that at times they marched by compass. The elevation gradually and steadily increased to 15,000 and even 16,500 feet; the mountain fever became worse, the storms more violent and continuous, and the temperature ranged from 7° (—14° C.), with wind, at midday to 30° below zero (—33° C.) at night. One by one their horses and camels died, and also an old Kirgese who followed them. Extensive glaciers were passed, from which flow on the one side the Salouen and Mekong into Indian ocean, and on the other the Yang-tse to China sea. On January 8, 1890, they skirted a large unfrozen lake named Montcalm, 50 miles long by 12 miles wide, and on January 14 traversed Duplex pass, 20,000 feet elevation. On the 31st they finally ran across a man, a wild Tibetan, small, thin, with enormous lips, long knotted hair, clothed in sheepskin and armed with a saber and flint-lock gun, whom they called "appa" (father); he knew neither Chinese nor Mogul, but spoke Tibetan of which the travelers knew scarcely a dozen words. Other Tibetans, with flocks of sheep, soon appeared and sold them mutton, a little salt, and rancid butter, and then followed on horseback for fifteen days without losing sight of the explorers. Often they were counseled in Mogul by those in authority to turn back.

In the middle of February they reached lake Nam-tso ("heaven"), or Tengri-nor, a large frozen body of water. Out of 40 camels only 15 remained, and of 20 horses but one survived; three of the party of seven were in desperate state of health, while all were worn out and almost without provisions. They were finally obliged to stop in a mountain pass of the Nindjin-tangla, which led directly to Lassa, then not more than sixty miles distant. On February 17 the Tibetan authorities sent a large party to meet them and ask their intentions. Mistaken for Russians, it took 13 days to convince the authorities that they were French. They received presents from the authorities and obtained costumes from Lassa, but found it impossible to visit the "holy city." After 49 days of negotiation, on April 5, provided with arms, provisions and horses, and also a safe permit from the Talia lama to cross Tibet to Batang by an unknown route, they started eastward, on a course nearly paral-

lel to and north of Salouen river, reaching Sô and once again seeing houses on April 15. They arrived at Batang early in June, their route some distance west of it having joined the Imperial highway from Pekin to Lassa over which l'Abbe Huc travelled. From Tatsien-lou', where the French Tibetan mission is located, their route turned southward to Red river, which was reached, at Manhoau, on September 21, when their journey practically ended, as Hanoai was reached two days later.

An excellent map of the itinerary, by Prince Henri, accompanies the article.

A. W. G.

Third Annual Report on the Statistics of Railways in the United States to the Interstate Commerce Commission, for the year ending June 30, 1890: Washington, Government Printing Office, 1891 (advance copy, pp. 1–100).—This pamphlet, by Professor Henry C. Adams, is issued in advance of the full report, which is promised to comprise about 875 pages. It contains a summary, digest and discussion of the full report.

It appears that the total railroad mileage on June 30, 1890, was 163,597, an increase of 5,838 miles during the year. The increase came mainly from southeastern and western states. This mileage was owned by 1,797 distinct corporate bodies, but entirely controlled in one way or another by only 747 companies. To illustrate the extent to which consolidation of railroad property has gone, it may be stated that 47.5 per cent of all railroad mileage is controlled by but forty companies, and that 65.4 per cent is controlled by seventy-five companies. The greatest mileage controlled by one company is 6,053, operated by the Southern Pacific company.

The total capital and bonded debt of railroad companies was $9,871,378,389, or $60,340 per mile. Stock and bonds were about equal in amount. Mr. Adams estimates the value of railroad property by capitalizing at 5 per cent the dividends and interest on bonds paid during the year, reaching as a result $6,627,461,140, or about ⅔ of the nominal capital and bonded debt. The justice of this method may fairly be questioned. A comparison of the ruling prices of dividend-paying stocks with the rate per cent of the dividend shows that 5 per cent stocks are above par and that 4 per cent stocks average nearly par.

Moreover, it is well known that many railroads are built and operated, not for their own immediate earnings but to give value to other property of the companies, notably to lands, from the sale or lease of which the companies derive profits. Again, many railroads are built, not for present but for future profits, after they shall have induced settlement of their territory; and, furthermore, numerous branch roads have been built as defensive measures to prevent rivals from occupying territory; and in many cases earnings are used in betterment of property instead of distributing it as dividends. In all these cases the roads have value, although they are not paying dividends.

Taking all these matters into account, it does not appear that the railroad stocks of the country have, collectively, been watered to any great extent, if by "watering" is meant expanding nominal values above actual values.

Concerning dividends paid on stock, Mr. Adams presents a table showing that 63.76 per cent of all stock paid no dividends; that but 6.47 per cent paid less than 4 per cent; that 25.26 per cent paid from 4 to 8 per cent, the remainder paying above 8 per cent. It appears that in the northeastern states much the highest dividends were paid, while in the west, so far as dividends are concerned, the stockholders have to wait for future developments.

The total passenger mileage for the year was 11,847,785,617, a slight increase over the previous year. The total freight mileage was 76,207,047,298, an increase of nearly 10 per cent over that of the previous year. The gross earnings of the year were $1,051,877,632, and the operating expenses $692,093,971, leaving as the income from operations $359,783,661. The income from other sources was $126,767,064, and the total deductions from income were $384,792,138, leaving as the net income $101,758,587, out of which there was paid as dividends on stock $89,688,204.

The magnitude of the railway interests of the country is set forth in the above enormous figures. It is still further emphasized by the fact that nearly three-quarters of a million men are in the employ of this industry. Assuming that each such employé supports two others besides himself, it is seen that the railroad interest supports two and a quarter millions, or more than one thirtieth of the inhabitants of the country.

H. G.

INDEX.

Page.

Abbe, Cleveland, cited on isostaths..... 43
—, Record of communication by..... viii
— — — discussion by viii
Aborigines of South America 7
Academy of Sciences, Russian, Quotation from records of 212
Adams, Henry C., Review of report on railway operations by 255
Adelung, J. C., Geographic work by..... 211
—, Quotation from, on de l'Isle's map..... 212, 213, 214
Admiralty bay 56
Africa, Area of..... 32
—, Conquest and division of 31
—, Natural divisions of..... 238
—, Population of 238
— (The Heart of); E. C. Hore 238
Agassiz glacier, Ascent of 147
— — named 73
Age of St. Elias range 175
Alaska (An expedition to Mount St. Elias,); I. C. Russell 53
—, Boundaries of..... 237
—, Early works concerning 206
—, Report of committee on exploration in 248
Allen, James, cited on isostaths..... 44
Alpenstocks, Necessity for 165
Alpine glaciers..... 176, 180
Alton, Edmund, Contribution to exploration fund by..... 75
Alvord, H. E., Remarks by, at field meeting x
Amazon, Discovery of the 11
—, Sketch of the 4
Amendment to by-laws proposed,..... xii
Andes, General description of the..... 1
Anemometer formula devised by C. F. Marvin 49
Angot, A., Reference to work of..... 46
Antiquities of Peru 8
Archangelica, Mention of..... 89, 114
Argentine Republic, Sketch of 19
Asia, Exploration in..... 253
Atrevida, Mention of the 63, 92, 105
Auriferous sands from Yakutat bay..... 196
Avalanches 145, 155

Baie de Monti 56
— named by La Pérouse 60
Baker, Marcus, cited on early eclipses,. 220
— — — Mount St. Elias 232
—, Explorations by 70, 72
—, Reference to bibliography by..... 58
—, Record of discussion by ..... viii, ix
Base Line, Measurement of 86
Bates, H. W., Quotation from, on South America..... 29
Bear, Meeting with the 94, 109
Belcher, Sir Edward, Explorations by..68, 69
Bell, A. Graham, Contribution to exploration fund by 75
Bell, Charles J., Contribution to exploration fund by..... 75
Bellin, S., Geographic work by 207
Bering bay, Mention of 56
Bering's first voyage (The cartography and observations of); A. W. Greely... 205
— provisions 219

Page.

Bering, Vitus, Explorations by 58
Berg, M., cited on thunderstorms..... 44
Bien, Morris, Contribution to exploration fund by 75
Bigelow, F. H., Record of communication by viii
Birnie, Jr., Rogers, Contribution to exploration fund by..... 75
Black glacier, Brief account of..... 101, 104
Blodgett, J. H., Record of discussion by ..... vii, ix
Blossom island, Description of 113, 122
Board on geographic names, Institution of the..... 39
Bonvalot, G., Crossing of Tibet by 253
Boussin, Henry, Mention of 79
Brazil, Revolution in 36
—, Sketch of 17
Broka, George, Explorations by 73, 74
Buache, Phillipe, Geographic work by... 208
Buchan, Alex., Reference to work of..... 44
Buckle, Sir Henry, Quotation from, on tropical America 29
By-laws, Proposed amendment to the ... xii

Camp hands 166
Carpenter, Z. T., Contribution to exploration fund by 75
Cartography, Discussion of..... 251
— (The) and Observations of Bering's First Voyage; A. W. Greely..... 205
Cascade glacier named 144
Century Company, Offer of coöperation by 249
Chaix hills named..... 73
Chariot, The, Mention of 140
Chatham, Mention of..... 66
Cherikof, Alexei, Explorations of..... 58
China, Exploration in..... 253
Christie, J. H., Member of expedition... 76
—, Work of..82, 83, 84, 96, 103, 112, 113, 123, 162
Climate of South America..... 6
Clover, Richardson, Contribution to exploration fund by..... 75
Coast and Geodetic Survey, Explorations by 70, 72
—, Offer of coöperation by 249
Cold waves, Prediction of..... 51
Collett, M. J., Review of map described by 250
Commerce of South America..... 17, 19, 23
Cook, Colonel James, Explorations of..... 58
Cordilleras of South America 1
Corwin cliffs, Mention of..... 138
Corwin (The) in Disenchantment bay.. ... 100
— Return of the..... 163
Crevasses 181, 182
— at Pinnacle pass..... 130
Cross sound visited by Vancouver's expedition 67
Crumbach, J. H., Member of expedition 76
—, Work of... 96, 103, 122, 125, 151, 131, 135, 139
Curtis, W. E., Record of communication by..... xi
Cyclones, Theory of..... 42

Dagelet, M., Mention of..... 60
Dahlgren, Ulrica, Presentation of flag by..... viii

Page.

DALL, W. H., cited on Bering's first voyage 205
— — — — supplies 219
— — — de l'Isle's map 218
— — — early eclipses 219
— — — Mount St. Elias 231
—, Explorations by 70, 72
—, Quotation from, on map by de l'Isle ... 207
—, Record of discussion by vii
—, Reference to bibliography by 58
DALTON, JOHN, Glacier named for 98
—, Mention of 73
D'ANVILLE, M., cited on early eclipses ... 229
DAVIS, W. M., Reference to meteorologic review by 47
DEDEKEN, P., Crossing of Tibet by 253
DEFINITION of formations in St. Elias region 167
DEKALB, COURTENAY, Record of communication by ix
DE L'ISLE, J. N., Authenticity of map by 211, 213
—, Geographic work by 206
—, Map by 207
—, Quotation from, on eclipses 220
DE MONTI BAY, Arrival at 79
DESCUBIERTA (The), Mention of 63
DESENGAÑO BAY, named by Malaspina 63
DEVIL'S CLUB (*Panax horridum*), Mention of 95, 115
DIGGES' SOUND, named by Vancouver 68
DILLER, J. S., Contribution to exploration fund by 75
DIP at Pinnacle pass 140
DISCOVERY (The), Mention of 66
DISENCHANTMENT BAY, Canoe trip in 96, 103
—, Last view of 103
—, Mention of 56
—, visited by Malaspina 63, 64
DIXON, CAPTAIN GEORGE, Explorations of .. 60, 62
DOBBINS, J. W., Contribution to exploration fund by 75
DOBBS, ARTHUR, Geographic work by 210
DOME PASS named 146
DONEY, L. S., Member of expedition 76
—, Work of 85, 158, 159, 160, 162
D'ORLEANS, PRINCE HENRI, Crossing of Tibet by 253
DOUGLASS, E. M., Record of discussion by. xi
DOUGLASS, COLONEL, Explorations of 62
DRY BAY, Mention of 55
DU BOCAGE, BARBIE, Geographic work by .. 211
—, Quotation from, on de l'Isle's map 216
DU FOSSE, E., cited on early publications. 207
DU HALDE, PÈRE, Geographic work by 206
—, Quotation from, on de l'Isle's map 218

EARTHQUAKES, South American 2
ECLIPSES, Early, observed in Kamshatka 219, 229
EIFFEL TOWER, Use of, in meteorology 46
EKHOLM, NILS, cited on isostaths 43
ELDORADO, Early accounts of 14
ELECTION of officers xii
ESPERANZA, POINT, Mention of 14, 85
EXPEDITION (An) to Mount St. Elias, Alaska; I. C. Russell 53
EXPLORATION in Alaska 248

FARENHOLT, LIEUTENANT COMMANDER O. E., of U. S. S. *Pinta* 79
FAULTED pebble from Pinnacle pass .. 171, 172
FAULTS 83, 136
—, Thrust, in Hitchcock range 118
FERREL, WILLIAM, cited on cyclones 42
—, Reference to treatise by 47
FINLEY, J. P., Reference to work of 50
FLORAL HILLS, Brief account of 105, 108
FLORAL PASS, brief account of 105, 108, 110

Page.

FORMATIONS of the St. Elias region 167
FOSSILS at Pinnacle pass 140
—, Description of, of Yakutat system 172
FOSSIL PLANTS, Report on, by Lester F. Ward 199, 200
FRANCE, Review of Staff Map of 250

GABBRO on the Marvine glacier 123
GALIANO, DON DIONISIO ALCALA, Mention of 63
GALIANO GLACIER, Visit to 89, 90
GANNETT, HENRY, Contribution to exploration fund by 75
—, Instructions from 194
—, Review of railway operations by 255
— — — Staff Map of France, by 250
GANNETT, S. S., Computation of height of Mount St. Elias, by 235
GEOGRAPHIC names, Board of 39
GEOGRAPHY of the Air; A. W. Greely 41
— — — Land; H. G. Ogden 31
GEOLOGICAL SURVEY, Acknowledgments to 40
—, Instructions from 192, 193, 194
—, Offer of coöperation by 249
GEOLOGY of the St. Elias region 167, 174, 190, 191
GILBERT, G. K., Instructions from 192, 193
—, Record of discussion by ..... vii, ix, x
—, Remarks by, at field meeting x
—, Report on exploration by 250
GLACIAL currents 187
— river, Example of 183
— streams 183, 184
GLACIER BAY, Mention of 67
GLACIERS in Disenchantment bay in 1792 ..... 64, 65, 97
— — — — observed by Malaspina 64, 65
— — — — — — Puget 67, 68
— of the St. Elias region 176
— west of Icy bay 187
GRACE, M. P., Financial operations by 23
GREELY, A. W., Contribution to exploration fund by 75
— cited on Mississippi floods 38
—; Geography of the Air 41
—, Note by, on polar regions 252
— — — — the crossing of Tibet 253
—, Record of communication by .. vii, viii, xi
—; The Cartography and Observations of Bering's First Voyage 205
GUIANA, Sketch of 13
GUIDES, Use of, in ascending St. Elias 166
GUYOT GLACIER named 73

HAENKE, D. TADEO, Haenke island named for 65
HAENKE ISLAND, Condition of, when seen by Malaspina 63, 64, 65, 97
—, Visit to 96, 103
HANN, JULIUS, cited on cyclones 42
HAYDEN, DR. F. V., Glacier named for 108
HAYDEN, EVERETT, Contributions to exploration fund by 75
—, Record of discussion by ..... vii, viii, ix, xi
—, Report on exploration by 250
HAYDEN GLACIER, Brief account of .. 108, 110, 111
HAYS, J. W., Contribution to exploration fund by 75
HAZEN, H. A., Reference to work of 50
HEIGHT and position of St. Elias 189, 190
HENDRICKSEN, REVEREND CARL J., Mention of 80, 83
HILL, S. A., Reference to work of 47
HILL, R. T., Record of communication by .. xiii
HITCHCOCK, PROFESSOR EDWARD, Range named for 112
HITCHCOCK RANGE, Brief account of 112
— from Pinnacle pass 133
—, Structure of 118

Page.

Hoogewerff, J. A., Record of communication by viii
Hooper, Captain C. L., Navigation of Disenchantment bay..... 56, 100
—, Offer of coöperation by 249
Hore, E. C., Record of address by..... vii
—; The Heart of Africa..... 238
Hosmer, E. S., Contribution to exploration fund by..... 75
—, Return of..... 83
—, Volunteer assistant 76
Hotchkiss, Jed., Record of communication by ..... ix, x
—, Testimonial to x
Hovey, H. C., Record of communication by x
—, Remarks by, at field meeting..... x
Howell, E. E., Record of communication by..... xi
Hubbard, Gardiner G., Contribution to exploration fund by..... 75
—, Glacier named for..... 99
—, Presentation of flag by..... viii
—, Record of presidential address by.... xiii
—; South America: Annual address by the President..... 1
Hubbard glacier, Brief description of ... 99
Huc, l'Abbé, Route of..... 255
Hughes, T. McKenney, Record of communication by..... x

Icebergs, Formation of 98, 99, 101, 102
— in Yakutat bay, Description of..... 87
Ice tunnels 184
Incas of Peru 8
Indians of South America..... 7
Instructions from Geological Survey..... 192, 193, 194
— — National Geographic Society 194
Irving, Professor R. D., Mountain named for..... 144

Jackson, Sheldon, Record of discussion by..... ix
Johnson, J. B., Record of discussion by.. xi
Johnson, Willard D., Contribution to exploration fund by..... 75
—, Exploration planned by..... 75
—, Record of discussion by vii
—, Report on exploration by..... 250
Judd, J. G., Contribution to exploration fund by 75
Jungen, Ensign C. W., Mention of..... 81

Kamshatka, Cartography of..... 217
—, Early eclipses in..... 219, 229
Kerr, Mark B., assigned as an assistant.. 75
— cited on Mount St. Elias 39
—, Report on topographic work by..... 195
Khantaak island, Village on 79, 80
King, Harry, Contribution to exploration fund by..... 75
Knapp, Hon. Lyman E., Mention of..... 79
Knight Island, Scenery near 83
— named by Puget 68
Knowlton, F. H., Report on fossil plants.. 199

La Boussole, Mention of..... 58
Lake Castani named..... 73
Lakelets on the glaciers..... 119, 120
Lakes, Abandoned beds of, near Blossom island..... 116
La Pérouse, J. F. S., Explorations of... 58, 60
La Plata river, Sketch of..... 5
Lassa, recent attempt to reach..... 253
L'Astrolabe, Mention of..... 58
Lauridsen, P., cited on early maps 215
—, Quotation from, on de l'Isle's map..... 217

Page.

Leach, Boynton, Contribution to exploration fund by..... 75
Levée systems of the Mississippi..... 37
Libbey, Professor William, Explorations by 72, 73
Lindenkohl, A., Computation of position of Mount St. Elias by 235
Lindsley, W. L., Member of expedition.. 76
—, Work of..... 122, 131, 134, 135, 139, 144, 149, 150, 153, 157, 158, 164
Littlehales, G. W., Record of discussion by..... vii
Lituya bay, Mention of..... 55
Lob-nor, Character of..... 253
Logan, Sir W. E., Mountain named for... 141
London Missionary Society, Acknowledgments to 247
Lucia glacier, Brief account of..... 192
— —, Crossing of... ..... 105, 106, 108, 109
Lynn canal, Mention of..... 78

Malaspina, Alejandro, cited on Mount St. Elias..... 231
—, Explorations of 62, 66
Malaspina glacier, Character of..... 187
— described and named..... 71, 72
—, Excursion on..... 120, 121, 162
— from Blossom island 118, 119
—, Mention of..... 56
Maldonado, Reference to..... 62, 63
Maps of Alaska, Rare 206
— (Staff) of France, Review of the..... 250
Marvin, C. F., Reference to work of..... 48
Marvine, A. R., Glacier named for..... 112
Marvine glacier, Account of 112, 122, 124
McCarteney, C. M., Contribution to exploration fund by..... 75
McGee, WJ, Record of communication by, xiii
—, Record of discussion by..... x, xi
Melville, G. W., Record of communication by..... viii
Mendenhall, T. C., Record of discussion by xi
Meteorology, Condition of..... 41
Meyer, Hugo; Reference to work of..... 47
Mirage in Yakutat bay 87
Mississippi river, Flood of 37
Monsoons, Characteristics of 47
Mongolia, Exploration in..... 255
Moon, Mountains of the..... 240
Moraines 195
—, Medial, on the Marvine glacier..... 123
— on the Malaspina glacier..... 134
— near Yakutat bay..... 191
Mountains of South America 1
Mount Augusta, Avalanches on the sides of 145
— Elevation of..... 117
Mount Bering, Height and condition of.. 65
Mount Cook, Appearance of..... 92
— named 72
—. Rocks composing 92
Mount Fairweather, Height of..... 69
Mount Logan named 141
Mount Malaspina, Elevation of. 117
— named 72
Mount Newton named 146
Mount St. Elias, Expedition to..... 53
— (see St. Elias, Mount).
Mount Vancouver named 72
Muir glacier, Visit to. 78, 79
Mulgrave, Lord, Port Mulgrave named for..... 60

National Geographic Society, Instructions from..... 194
Névé fields..... 180, 181, 182
Newell, F. H., Record of communication by xi

Page.

Newton glacier, Ascent of. 150
Newton, Henry, Mountain named for..... 146
New York Times, Expedition of the.. 172, 173
Nicaragua canal, Progress of the..... 37
Nolin, J. B., Geographic work by 211
Nomenclature, Geographic..... 39
Nordhoff, Charles, Contribution to exploration fund by..... 75
Norris glacier, Mention of 78
Nunatak in Lucia glacier..... 106

Officers, Election of xii
Ogden, H. G.; Geography of the Land.... 31
—, Record of communication by xi
—, Record of discussion by..... viii, xi
Oil stoves, Use of..... 164
Orel, Mention of the..... 70
Orinoco river, Sketch of..... 3
Orthography of geographic names..... 39
Orton, James, Quotation from, on South America 28
Otkrytie, Mention of the..... 69
Outfit necessary for Alaskan expeditions..... 165

Panax horridum..... 95, 115
Pampas, Characteristics of..... 19
Panama canal project, Revival of the..... 37
Pan-American congress, Work of the 36
— railway route 27
Partridge, William, Member of expedition..... 76
—, Work of..... 158, 159, 162
Partsch, Dr., Reference to work of..... 46
Peary, R. E., Record of communication by viii
Peru, Incas of..... 8
—, Sketch of. 22
Phipps, C. J., Port Mulgrave named for... 60
Piedmont glaciers, Characteristics of..... 122
176, 185, 186
— —, Example of 120, 121
— type of glaciers, Mention of..... 57
Pimpluna rocks, Mention of... ..... 70, 187
Pinnacle pass cliffs, Account of..... 132, 137
— —, Height of..... 137
— —, View from..... 132
—, Description of..... 130, 132
— named 130
Pinnacle system, Description of rocksof.. 167
— named 131
Pinta, Mention of the..... 79, 81
Pizarro, Gonzalo, Discovery of the Amazon by..... 11
Plants on Blossom island 114
Point Esperanza, Camp at..... 82, 84, 85
Point Glorious named 137
Point Riou, Mention of..... 69
Polar regions, Recent work in 252
Pomortsew, Dr., Reference to work of ... 46
Population of Africa.... 238
— of South America..... 6, 15
Port Mulgrave..... 56
— named by Dixon..... 60
Powell, J. W., Contribution to exploration fund by..... 75
—, Record of communication by viii
— — — discussion by..... x
— — — introductory remarks by..... xiii
Powell, William B., Contribution to exploration fund by 75
Puerto del Desengaño, Mention of..... 56
Puget, Peter, Explorations of 66, 68
Pyramid harbor, Mention of..... 78

Queen Charlotte, Mention of the..... 60
—, Voyage on the..... 78, 79

Page.

Rabot, Ch., cited on polar exploration..... 252
Railroads, South American..... 25
—, Statistics of... 255
Raleigh, Sir Walter, Expeditions by ... 14
Rations 164
Report on sands from Yakutat bay by J. Stanley-Brown. 196
Resolution relating to publication.. .. xii
Revenue Marine Service, Offer of coöperation by..... 249
Reynolds, J. J., Remarks by, at field meeting..... x
Rio de la Plata, Sketch of 5
Rivers, Glacial 183
— of South America..... 3
Rockhill, W. W., Reference to explorations by 253
Rope cliff named..... 149
Route (New), Suggested 163, 164
Russell, I. C.; An Expedition to Mount St. Elias..... 53
— cited on Mount St. Elias 39
—, Contribution to exploration fund by .. 75
—, Height and Position of Mount St. Elias..... 231
—, Proposed exploration by..... 249
—, Record of communication by..... vii, xi
— — — discussion by ... . vii, ix
Russell, Thomas, Acknowledgments to .. 62
— cited on cyclones..... 43
—, Reference to work of..... 51
Russian Academy of Sciences, Quotation from records of..... 212
"Russian Officer," Geographic work by the. 209
—, Identity of the 222
—, Quotation from the, on de l'Isle's map 215, 217
— — — — — — writings..... 221

Salmon fishing 162
Sands, Auriferous, from Yakutat bay..... 196
San Francisco river, Sketch of..... 5
Sangai, Active vulcanism of..... 2
Schwatka, Lieutenant Frederick, Explorations by..... 72, 73
Serpentine on the Marvine glacier..... 123
Seton-Karr, H. W., Explorations of ... 72, 73
Seward glacier, Crevasses on..... 133, 179, 180
—, Crossing of 142
—, Description of 177, 178, 179
Seward, Hon. W. H., Glacier named for . 129
Sharp, Benjamin, Record of communication by xiii
Shendun, Field meeting at..... ix, x
Siemens, Werner von, cited on air currents..... 45
Sitka, Arrival at..... 79
Snow crests, Figures of..... 143
— line, Description of Alpine glaciers above..... 180
— — — — — — below..... 183
— —, Elevation of. 92, 111
— on mountain crests..... 182
Soundings in Disenchantment bay,..... 56
South America: Annual address by the President; Gardiner G. Hubbard..... 1
Sprung, A., cited on air currents..... 45
Stamy, Thomas, Member of expedition... 76
—, Work of.. 137, 139, 144, 150, 153, 157, 158, 160
Stanley-Brown, J., Record of communication by. vii
—, Report on sands from Yakutat bay by 196
St. Elias, Described by La Pérouse..... 59, 60
—, Discovery of, by Bering..... 58
— expedition, Review of..... 39
—, First full view of..... 135

Page.

St. Elias (Height and position of Mount); I. C. Russell 231
— — — — — 40, 189, 190
— — — — — determined by La Pérouse.. 60
— — — — — — — Tebenkof 69
— — — — — — — Malaspina.. ..... 64, 65, 66
— range, Age of 175
— —, Character of peaks of..... 175
— region, Glaciers of the..... 176
— schist, Description of rocks of..... 167, 173
—, Suggested new route to..... 163, 164
— uplift..... 190
Stein, Robert, Translations by .. 59, 64, 65, 66
Stepniak, Sergius, Record of address by.. viii
Strait of Annan..... 56
Structure 174
Struve, Ch., Acknowledgments to 221
Struve, O., cited on manuscript records.. 220
Swiss guides in Alaskan exploration..... 166
Sulphur, Mention of the..... 69

Taku glacier, Mention of..... 78
Taku inlet, Visit to 78
Tanganyika, Lake, Characteristics of 241
Tebenkof, Colonel, Notes on Alaska by..69, 70
Terrace on northern shore of Yakutat bay 82, 85
— point, Brief account of..... 106
Thunderstorms, Relation of, to air-pressure 44
Thompson, Gilbert, Contribution to exploration fund by 75
Tibet, Note on the crossing of 253
Tide-water glaciers defined 101
Topographic work, Report on 195
Topham, Edward, Explorations by..... 73, 74
Topham, W. H., Explorations by 73, 74
—, Reference to map by.. 177

Page.

Tornadoes, Results of 50
Trade, South American..... 23
Triangulation, Commencement of 86
Tucker, J. Randolph, Remarks by, at field meeting x
Tunnels, Ice..... 184
Tyndall glacier named..... 73
Tyndall, J., cited on marginal crevasses.. 127

Van Bebber, A., Reference to work of ... 47
Vancouver, Colonel George, Explorations by 66, 68
Veratrum viride, Mention of..... 114
Volcanoes of the Andes..... 2

Ward, Lester F., Report on fossil plants 199, 200
Waxel, Swen, Quotations from, on de l'Isle's map 223
—, Translations from letter by 224
—, Work of..... 222
White, Thomas, Member of expedition... 76
—, Work of..... 58, 60
Williams, C. A., Contribution to exploration fund by..... 75
Williams, William. Explorations by... 73, 74
Willis, Baily, Contribution to exploration fund by 75
Wilson, H. M., Record of communication by ix

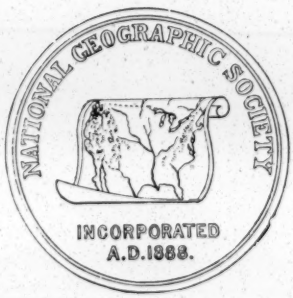
Yakutat bay, Arrival at 79
—, Base camp on western shore of..... 86, 89
—, Shores of described..... 57
—, Synonomy of..... 56
Yakutat Indians described by Dixon 61
— system, Description of rocks of 167
— — named 131

THE

NATIONAL

GEOGRAPHIC MAGAZINE

VOLUME III, 1891



WASHINGTON

PUBLISHED BY THE NATIONAL GEOGRAPHIC SOCIETY

1892

OFFICERS OF THE NATIONAL GEOGRAPHIC SOCIETY

1891

GARDINER G. HUBBARD, *President*

HERBERT G. OGDEN
EVERETT HAYDEN
A. W. GREELY
C. HART MERRIAM
HENRY GANNETT
Vice-Presidents

CHARLES J. BELL, *Treasurer*

MARCUS BAKER
C. A. KENASTON
Secretaries

ROGERS BIRNIE, JR.
G. K. GILBERT
G. BROWN GOODE
WILLARD D. JOHNSON
W J McGEE
T. C. MENDENHALL
W. B. POWELL
B. H. WARDER
Managers

PRINTERS
JUDD & DETWEILER
WASHINGTON

ENGRAVERS
MOSS ENGRAVING CO.
NEW YORK

CONTENTS.

	Page
South America: Annual Address by the President, GARDINER G. HUBBARD	1
Geography of the Land: Annual Report by Vice-President HERBERT G. OGDEN	31
Geography of the Air: Annual Report by Vice-President A. W. GREELY	41
An Expedition to Mount St. Elias, Alaska; by ISRAEL C. RUSSELL	53
Introduction—The Southern Coast of Alaska	55
Part I—Previous Explorations in the St. Elias Region	58
Part II—Narrative of the St. Elias Expedition of 1890	75
Part III—Sketch of the Geology of the St. Elias Region	167
Part IV—Glaciers of the St. Elias Region	176
Part V—Height and Position of Mount St. Elias	189
Appendix A—Official Instructions governing the Expedition	192
Appendix B—Report on topographic Work; by MARK B. KERR	195
Appendix C—Report on auriferous Sands from Yakutat bay; by J. STANLEY-BROWN	196
Appendix D—Report on fossil Plants; by LESTER F. WARD	199
Index	201
The Cartography and Observations of Bering's First Voyage; by A. W. GREELY	205
Height and Position of Mount St. Elias; by ISRAEL C. RUSSELL	231
The Heart of Africa; by E. C. HORE	238
Report of Committee on Exploration in Alaska	248
Notes—La Carte de France, dite de l'Etat Major, par M. J. COLLET	250
Polar Regions	252
The crossing of Tibet	253
Statistics of Railways in United States	255
Index to volume III	257
Title-page and Imprimatur of Board of Managers	i
Contents and Illustrations	iii
Publications of the National Geographic Society	v
Proceedings of the National Geographic Society	vii
Officers of the Society for 1892	xiv
Members of the Society	xv

ILLUSTRATIONS.

		Page
Plate	1—South America (map)	1
	2—Sketch Map of Alaska	53
	3—Map of the St. Elias Region, after La Pérouse	60
	4—Map of the eastern Shore of Yakutat Bay, after Dixon	62
	5—Map of the St. Elias Region, after Malaspina	64
	6—Map of Bay de Monti, after Malaspina	66
	7—Map of Disenchantment Bay, after Malaspina	68
	8—Sketch Map of St. Elias Region, by MARK B. KERR	75
	9—The Hubbard Glacier	100
	10—Wall of Ice on eastern Side of Atrevida Glacier	102
	11—View on Atrevida Glacier	104
	12—Entrance of an Ice Tunnel	106
	13—Deltas in an abandoned Lake Bed	108
	14—A River on Lucia Glacier	110
	15—Entrance to a glacial Tunnel	112
	16—View of Malaspina Glacier from Blossom Island	114
	17—Moraines on Marvine Glacier	116
	18—View of the Hitchcock Range from near Dome Pass	118
	19—View of Mount St. Elias from Dome Pass	146
	20—View of Mount St. Elias from Seward Glacier	190
	21—Carte Générale des Découvertes de l'Amiral de Fonte (1752)	205
RUSSELL:	Figure 1—Diagram illustrating the Formation of Icebergs.	101
	2—View of a glacial Lakelet	119
	3—Section of a glacial Lakelet	120
	4—Diagram illustrating the Formation of marginal Crevasses	128
	5—Crevasses near Pinnacle Pass	130
	6—Snow Crests on Ridges and Peaks	143
	7—Faulted Pebble from Pinnacle Pass	171
	8—Faulted Pebble from Pinnacle Pass	172

PUBLICATIONS OF THE NATIONAL GEOGRAPHIC SOCIETY.

Regular Publications.

In addition to announcements of meetings and various circulars sent to members from time to time, the Society issues a single serial publication entitled The National Geographic Magazine. During the first two years of the existence of the Society this serial was issued in quarterly numbers. With the beginning of the third year of the Society and the third volume of the *Magazine* the form of publication was changed, and the serial now appears at irregular intervals in parts or brochures (designated by pages and designed either for separate preservation or for gathering into volumes) which consist either of single memoirs or of magazine brochures made up of articles, notes, abstracts, and other geographic matter, together with the Proceedings and other administrative records of the Society.

The *Magazine* is mailed free to members of the Society and to exchanges. The first two volumes, as well as the separate brochures of the third and the complete volume, are sold at the prices given below by the Secretary, Mr. F. H. Newell, U. S. Geological Survey, Washington, D. C.

	To Members.	To the Public.
Volume I, 1889: 4 numbers, 334 pages, 16 plates and 26 figures	$1 40	$2 00
Volume II, 1890: 5 numbers, 344 pages, 10 plates and 11 figures	1 40	2 00
Volume III, 1891: Comprising:		
South America; Annual Address by the President, Gardiner G. Hubbard: pp. 1–30, pl. 1, March 28, 1891	80 15	80 25
Geography of the Land; Annual Report by Vice-President Herbert G. Ogden: pp. 31–40, April 30, 1891	10	25
Geography of the Air; Annual Report by Vice-President A. W. Greely: pp. 41–52, May 1, 1891	10	25
An Expedition to Mount St. Elias, by I. C. Russell: pp. 53–204 (with 8 figures), pls. 2–20, May 29, 1891	85	1 50
Magazine brochure, pp. 205–261, i–xxxv, pl. 21, February 19, 1892	40	75
	1 60	3 00

Irregular Publications.

In the interests of exact bibliography, the Society takes cognizance of all publications issued either wholly or partly under its auspices. Each author of a memoir published in The National Geographic Magazine receives 25 copies, and is authorized to order any number of additional copies at a slight advance on the cost of press-work and paper; and these separate brochures are identical with those of the regular edition issued by the Society. Contributors to the magazine brochures are authorized to order any number of copies of their contributions at a slight advance on cost of press-work and paper, provided these separates bear the original pagination and a printed reference to the serial and volume from which they are extracted; but such separates are bibliographically distinct from the brochures issued by the Society. The *Magazine* is not copyrighted, and articles may be reprinted freely; and a record of reprints, so far as known, is kept.

The following separates and reprints from volume III have been issued:

Editions uniform with the Brochures of the Magazine.

Pages 1–30, plate 1:	150 copies,	March	28, 1891.
" 31–40,	25 "	May	2, 1891.
" 41–52,	25 "	"	2, 1891.
" 53–204, plates 2–20:	250 "	"	29, 1891.

Special Editions.

Pages 205–230, plate 21:	50 copies,	February	18, 1892.
" 231–237,	100 "	"	16, 1892.
" v,	1,000 "	"	19, 1892.
" xv–xxxv,	50 "	"	13, 1892.

Reprints.

Pages 196–198,	100 copies,	January	3, 1892.

PROCEEDINGS

OF THE

NATIONAL GEOGRAPHIC SOCIETY.

(*Abstract of Minutes.*)

March 6, 1891. *49th meeting.*

Meeting held in the Assembly Hall of the Cosmos Club. Vice-President Hayden in the chair. Attendance, 50.

Captain E. C. Hore, master mariner, delivered an address on "A narrative of ten years' work and travel in the African lake region." *Abstract entitled "The Heart of Africa" printed in this volume, pp. 238–243.*

March 13, 1891. *Special meeting.*

Meeting held in the Lecture Room of the National Museum. Vice-President Ogden in the chair. Attendance, 850.

Captain E. C. Hore repeated his former lecture with additions. *Abstract printed in this volume, pp. 243–247.*

March 20, 1891. *50th meeting.*

Meeting held in the Assembly Hall of the Cosmos Club. Mr. G. K. Gilbert in the chair. Attendance, 35.

Vice-President Greely read a paper on "The cartography and observations of Bering's first voyage." The paper was discussed by Messrs Dall, Blodgett, Littlehales, and Vice-President Hayden. *Printed in this volume, pp. 205–230, pl. 21.*

Mr. J. Stanley-Brown presented a paper on "Auriferous sands from Yakutat bay." *Printed in this volume, pp. 196–198.*

Mr. I. C. Russell read a paper on "The geology of the Mount St. Elias region, Alaska." The paper was discussed by Messrs Gilbert (who had resigned the chair to Vice-President Hayden), Dall, Johnson, and Russell. *Incorporated in the memoir forming pp. 53–204, pls. 2–20, of this volume.*

March 31, 1891. *Special meeting.*

Meeting held in the Law Lecture Room of Columbian University. Vice-President Ogden in the chair. Attendance, 300.

Mr. Sergius Stepniak delivered an address on "The Russian peasantry."

April 3, 1891. *51st meeting.*

Meeting held in the Assembly Hall of the Cosmos Club. Vice-President Hayden in the chair. Attendance, 35.

A paper on "The Mackenzie river and Colinson," by Vice-President Greely, was read by title in the absence of the author.

Ensign J. A. Hoogewerff, U. S. N., presented an account of the "Magnetic work of the United States Naval Observatory." The paper was discussed by Messrs Baker, Abbe, Ogden, Hayden, and Hoogewerff.

Mr. F. H. Bigelow presented a paper on "Auroral streamers."

Mr. Cleveland Abbe made some remarks on "Theories of magnetic phenomena."

April 11, 1891. *Special meeting.*

Meeting held in the Lecture Hall of the National Museum. President Hubbard in the chair. Attendance, 750.

Major J. W. Powell delivered an address on "The Grand cañon of Colorado river."

April 17, 1891. *52d meeting.*

Meeting held in Lincoln Hall. President Hubbard in the chair. Attendance, 1,000.

Mr. Geo. W. Melville, Engineer-in-Chief, U. S. N., briefly explained the purposes of arctic exploration.

Civil Engineer R. E. Peary, U. S. N., addressed the Society on the subject of his proposed northern Greenland expedition of 1891–92. The lecturer exhibited and explained a number of lantern-slide views illustrating arctic scenery and modes of traveling.

On the conclusion of the address a United States flag, provided for the purpose by Miss Ulrica Dahlgren, was presented by the President on behalf of the Society to Lieut. Peary, who responded feelingly.

April 24, 1891. *Special meeting.*

Meeting held in the Lecture Room of the National Museum. Attendance, 400.

Mr. H. M. Wilson, of the United States Geological Survey, delivered an address on the subject "India: Its geography and people." At the close of the lecture Mr. Wilson exhibited and explained a number of lantern-slides made from views taken by him while traveling in India.

May 1, 1891. *53d meeting.*

Meeting held in the Lecture Hall of the National Museum. Vice-President Hayden in the chair. Attendance, 600.

Mr. Courtenay De Kalb delivered an address on "The great Amazon: Personal investigations on the Great River and in its upper valley." At the close of the lecture Mr. De Kalb exhibited a number of lantern-slide views, which he described.

May 15, 1891. *54th meeting.*

Meeting held in the Assembly Hall of the Cosmos Club. Vice-President Hayden in the chair. Attendance, 25.

At the request of the Board of Managers, Mr. Marcus Baker made a statement relative to plans by the Board for further Alaskan exploration in the vicinity of Mount St. Elias under the conduct of Mr. I. C. Russell, to be prosecuted the coming season.

Mr. Gilbert, complying with the request of the Chairman, addressed the Society upon some of the questions involved in Alaskan geology.

Dr. Sheldon Jackson, at the invitation of the Society, spoke on the general aspects of the Alaskan coast and the inhabitants of the country.

Remarks were made, following Dr. Jackson's address, by the Chairman, Mr. J. H. Blodgett, and others.

In connection with the announcement of the proposed Field Day, June 3 and 4 next, to the grottoes near Shendun, in the Shenandoah valley, Virginia, Major Jed. Hotchkiss gave an interesting account of the topography of the valley.

An exhibition of lantern-slide views of Alaskan coast scenery followed, the pictures being explained by Mr. I. C. Russell.

May 29, 1891. *55th meeting.*

Meeting held in the Lecture Room of the National Museum. Attendance, 800.

Reverend Dr. H. C. Hovey delivered an address on "Subterranean scenery as found in the grottoes of the Shenandoah and other caverns of Virginia," with illustrations from lantern-slide views exhibited for the first time. Following the address, Major Hotchkiss illustrated with free-hand sketches on the blackboard the topography of the valley of Virginia, interspersing his remarks with war reminiscences.

June 3 and 4. *Field meeting.*

About 80 members left Washington on special train June 3, arriving at 3 p. m. at Shendun, Virginia, where they were entertained by the Grottoes company. Weir cave was visited that afternoon, and in the evening a meeting was held in the hotel parlor, at which remarks were made by Mr. G. K. Gilbert, Reverend Dr. H. C. Hovey, Major H. E. Alvord, Captain Morton, General J. J. Reynolds, and Hon. J. Randolph Tucker. The next morning Major Hotchkiss entertained the company with a description of the resources of the Valley of Virginia, his remarks being illustrated by free-hand sketches. The Cave of the Fountain was then visited, and, after presenting a testimonial to Major Hotchkiss for the hospitality of the Grottoes company, the party left for Washington.

October 15, 1891. *Special meeting.*

Meeting held in the Assembly Hall of the Cosmos Club. President Hubbard in the chair. Attendance, 50.

Professor T. McKenney Hughes, professor of geology at Cambridge University, England, gave a sketch of geological problems and the larger questions of geology in England.

Messrs Powell, McGee, and Gilbert made remarks on the geologic subjects touched upon by Professor Hughes.

November 14, 1891. *56th meeting.*

Meeting held in the Lecture Hall of Columbian University. President Hubbard in the chair. Attendance, 400.

The exercises consisted of an exhibition of Arctic photographs

by General A. W. Greely, U. S. A., comprising lantern-slide views from photographs taken during the expedition to Lady Franklin bay in 1881, and never before exhibited in the city.

November 27, 1891. *577th meeting.*

Meeting held in the Assembly Hall of the Cosmos Club. Vice-President Hayden in the chair. Attendance, 65.

Mr. Herbert G. Ogden made an oral communication on "The geographic position of Mount St. Elias," illustrated by a chart exhibiting the position of St. Elias, Icy bay, Yakutat bay, and the adjacent coast as determined (1) from various surveys compiled by the United States Coast and Geodetic Survey, (2) by Mark B. Kerr during the first expedition of the Society, and (3) by I. C. Russell during the second expedition.

The communication was discussed by Messrs Mendenhall, Douglas, and Vice-President Hayden.

Mr. E. E. Howell then exhibited and briefly described a relief model of the United States, constructed on the natural curvature, the vertical scale being three times that of the horizontal.

Remarks were made by Messrs Ogden, McGee, Johnson, Mendenhall, Howell, Hayden, and others.

December 4, 1891. *Special meeting.*

Meeting held in the Lecture Hall of Columbian University.

Mr. William Eleroy Curtis delivered an address on "Portraits of Columbus." The lecturer exhibited copies of all Columbus' portraits extant, these having been prepared for the World's Columbian exposition.

December 11, 1891. *578th meeting.*

Meeting held in the Lecture Hall of Columbian University. Vice-President Greely in the chair. Attendance, 400.

Mr. I. C. Russell gave an account of the Mount St. Elias exploration of last summer, illustrated by a map and lantern slides.

December 18, 1891. *Special meeting.*

Meeting held in the Lecture Hall of Columbian University. Vice-President Hayden in the chair. Attendance, 100.

Mr. F. H. Newell delivered an address on "Petroleum and natural gas." The lecture was illustrated by lantern slides made from photographs taken in the oil regions of the United States.

December 23, 1891. —*59th (4th annual) meeting.*

Meeting held in the Assembly Hall of the Cosmos Club. Vice-President Greely in the chair.

The annual report of the Secretaries was presented, amended, and adopted.

The annual report of the Treasurer was presented and referred to an auditing committee consisting of Messrs P. H. Christie, Middleton Smith, and E. E. Haskell.

The annual election of officers for the year 1892 was then held, with the following result:

President—Gardiner G. Hubbard.

Vice-Presidents—H. G. Ogden (land).
Everett Hayden (sea).
A. W. Greely (air).
C. Hart Merriam (life).
Henry Gannett (art).

Treasurer—C. J. Bell.

Recording Secretary—F. H. Newell.

Corresponding Secretary—E. R. Seidmore.

Managers—Marcus Baker.
H. F. Blount.
G. K. Gilbert.
John Hyde.
W J McGee.
T. C. Mendenhall.
W. B. Powell.
Edwin Willits.

The following resolution was adopted:

Resolved, That the Board of Managers be requested to consider whether, instead of the present policy of publishing only a few selected articles, these might not advantageously be replaced by a greater variety of less lengthy and expensive works, and whether a few pages of geographic notes might not be inserted.

Mr. Hayden gave notice of the following proposed amendment to the By-laws:

In article IV, instead of five vice-presidents, read six vice-presidents, and insert at the end of list of departments of geographic science, after geographic art, the words "commercial geography."

December 30, 1891. *Special meeting.*

Meeting held in the Lecture Hall of the National Museum. President Hubbard in the chair. Attendance, 200.

Professor Benjamin Sharp of the Academy of Natural Sciences of Philadelphia, Pennsylvania, made an address upon Peary and the western Greenland expedition. The lecture was illustrated by lantern slides from photographs taken on the expedition while along the shores of Greenland and at Peary's camp.

January 8, 1892. *60th meeting.*

Meeting held in the Assembly Hall of the Cosmos Club. Vice-President Merriam in the chair. Attendance, 150.

Mr. W J McGee delivered an address on "The Eastern Sierra Madre of Mexico," his lecture being illustrated by lantern slides made from photographs taken in the vicinity of Monterey, Saltillo, Matehuala, Miquihuana, Doctor Arroyo, and the hacienda El Carmen. Professor R. T. Hill described the similarity of topographic features of that region to those of the Great Basin of the United States.

January 15, 1892. *Special meeting.*

Meeting held in the Lecture Hall of Columbian University. Vice-President Hayden in the chair. Attendance, 100.

The President, Mr. Gardiner G. Hubbard, delivered his annual address on the subject of "The Evolution of Transportation." Major J. W. Powell prefaced the President's address by brief introductory remarks.

OFFICERS OF THE SOCIETY.

1892.

President.

GARDINER G. HUBBARD.

Vice-Presidents.

HERBERT G. OGDEN.
EVERETT HAYDEN.
A. W. GREELY.
C. HART MERRIAM.
HENRY GANNETT.

Treasurer.

CHARLES J. BELL.

Secretaries.

F. H. NEWELL. E. R. SCIDMORE.

Managers.

MARCUS BAKER.
HENRY F. BLOUNT.
G. K. GILBERT.
JOHN HYDE.
W J McGEE.
T. C. MENDENHALL.
W. B. POWELL.
EDWIN WILLITS.

MEMBERS OF THE SOCIETY.

1892.

a, original members. *c*, corresponding members.
l, life members. * Deceased.
In cases where no city is given in the address, Washington, D. C., is to be understood.

ABBE, PROF. CLEVELAND, *a*, *l*, Weather Bureau.

ABERT, S. T., 722 Seventeenth Street.

ACKERMAN, ENS. A. A., U. S. N., *c*, Navy Department.

ACKLEY, LIEUT. COMDR. S. M., U. S. N., Coast and Geodetic Survey.

ADDISON, A. D., 808 Seventeenth Street.

AHERN, LIEUT. GEORGE P., U. S. A., *c*, College of Montana, Deer Lodge, Mont.

AHERN, JEREMIAH, U. S. Geological Survey, Los Angeles, Cal.

ALLEN, DR. J. A., American Museum Natural History, New York, N. Y.

ALTON, EDMUND, Wormley's Hotel.

ALVORD, MAJ. HENRY E., *c*, Md. Agricultural College, College Park, Maryland.

ANDREWS, ENS. PHILIP, U. S. N., Navy Department.

APLIN, S. A., JR., Geological Survey.

ASPINWALE, REV. J. A., 17 Dupont Circle.

AYRES, MISS SUSAN C., *a*, 1813 Thirteenth Street.

BABB, CYRUS C., Geological Survey.

BABER, HON. GEORGE, 1416 K Street.

BAKER, DR. FRANK, *a*, Smithsonian Institution.

BAKER, LUCIUS, *c*, P. O. Drawer T, Fresno, Cal.

Baker, Marcus, *a*,	Geological Survey.
Baldwin, H. L., Jr., *a*,	Geological Survey.
Ball, Chas. B.,	942 T Street.
Bancroft, Rev. Dr. Cecil F. P., *c*,	Phillips Academy, Andover, Mass.
Barker, Comdr. Albert S., U. S. N.,	Navy Department.
Barnard, E. C., *a*,	Geological Survey.
Barnes, Charles A., *c*,	P. O. Box 1198, Seattle, Wash.
Barroll, Lieut. Henry H., U. S. N., *c*,	Navy Department.
Bartle, R. F.,	947 Virginia Avenue SW.
Bartlett, Comdr. J. R., U. S. N., *a*,	Navy Department.
Bartlett, P. V. S.,	U. S. Geological Survey, Berkeley, Cal.
Bassett, C. C., *a*,	Geological Survey.
Batchelder, C. F., *c*,	7 Kirkland Street, Cambridge, Mass.
Bauer, Louis A.,	Coast and Geodetic Survey.
Bayley, Dr. W. S., *c*,	Colby University, Waterville, Me.
Beaman, W. M.,	Geological Survey.
Bell, A. Graham, *a*,	Volta Bureau, 3414 Q Street.
Bell, Prof. A. Melville,	1525 Thirty-fifth Street.
Bell, C. J., *a*,	1406 G Street.
Bergmann, H. H.,	511 Seventh Street.
Bernadou, Ens. John B., U. S. N., *c*,	Navy Department.
Bien, Julius, *a*,	P. O. Box 3557, New York, N. Y.
Bien, Morris, *a*,	Geological Survey.
Bigelow, Prof. Frank H.,	1416 K Street.

BIRCH, CHARLES E., Hydrographic Office.

BIRNEY, GEN. WILLIAM, 458 Louisiana Avenue.

BLAIR, H. B., *a*, Geological Survey.

BLODGETT, JAMES H., *a*, 1237 Massachusetts Avenue.

BLOUNT, HENRY F., 1405 G Street.

BODFISH, SUMNER H., *a*, 58 B Street NE.

BOURSIN, HENRY, Douglas, Alaska.

BOWERS, DR. STEPHEN, *c*, Ventura, Cal.

BRECKINRIDGE, GEN. J. C., U. S. A., War Department.

BRIGHT, RICHARD R., Navy Department.

BRITTON, A. T., 1405 G Street.

BROWNELL, ERNEST H., *c*, Bristol, R. I.

BUCKLEY, MISS M. L., Bureau of Pensions.

BURNETT, CHARLES A., *c*, 620 Burke Building, Seattle, Wash.

BURTON, PROF. A. E., *a*, Massachusetts Institute of Technology, Boston, Mass.

CAMPBELL, M. R., Geological Survey.

CANNON, H. B., Department of Agriculture.

CANTWELL, LIEUT. J. C., U. S. R. M., *c*, 1818 Sacramento Street, San Francisco, Cal.

CARMAN, MISS ADA, 1351 Q Street.

CARROLL, CAPT. JAMES, *c*, Juneau, Alaska.

CHAMBERLIN, PROF. T. C., *c*, 772 Langdon Street, Madison, Wis.

CHAPIN, FREDERICK E., 3043 P Street.

CHAPIN, DR. J. H., Meriden, Conn.

CHAPMAN, R. H., *a*, U. S. Geological Survey, Berkeley, Cal.

Baker, Marcus, *a*,	Geological Survey.
Baldwin, H. L., Jr., *a*,	Geological Survey.
Ball, Chas. B.,	942 T Street.
Bancroft, Rev. Dr. Cecil F. P., *c*,	Phillips Academy, Andover, Mass.
Barker, Comdr. Albert S., U. S. N.,	Navy Department.
Barnard, E. C., *a*,	Geological Survey.
Barnes, Charles A., *c*,	P. O. Box 1198, Seattle, Wash.
Barroll, Lieut. Henry H., U. S. N., *c*,	Navy Department.
Bartle, R. F.,	947 Virginia Avenue SW.
Bartlett, Comdr. J. R., U. S. N., *a*,	Navy Department.
Bartlett, P. V. S.,	U. S. Geological Survey, Berkeley, Cal.
Bassett, C. C., *a*,	Geological Survey.
Batchelder, C. F., *c*,	7 Kirkland Street, Cambridge, Mass.
Bauer, Louis A.,	Coast and Geodetic Survey.
Bayley, Dr. W. S., *c*,	Colby University, Waterville, Me.
Beaman, W. M.,	Geological Survey.
Bell, A. Graham, *a*,	Volta Bureau, 3414 Q Street.
Bell, Prof. A. Melville,	1525 Thirty-fifth Street.
Bell, C. J., *a*,	1406 G Street.
Bergmann, H. H.,	511 Seventh Street.
Bernadou, Ens. John B., U. S. N., *c*,	Navy Department.
Bien, Julius, *a*,	P. O. Box 3557, New York, N. Y.
Bien, Morris, *a*,	Geological Survey.
Bigelow, Prof. Frank H.,	1416 K Street.

BIRCH, CHARLES E., Hydrographic Office.

BIRNEY, GEN. WILLIAM, 458 Louisiana Avenue.

BLAIR, H. B., *a*, Geological Survey.

BLODGETT, JAMES H., *a*, 1237 Massachusetts Avenue.

BLOUNT, HENRY F., 1405 G Street.

BODFISH, SUMNER H., *a*, 58 B Street NE.

BOURSIN, HENRY, Douglas, Alaska.

BOWERS, DR. STEPHEN, *c*, Ventura, Cal.

BRECKINRIDGE, GEN. J. C., U. S. A., War Department.

BRIGHT, RICHARD R., Navy Department.

BRITTON, A. T., 1405 G Street.

BROWNELL, ERNEST H., *c*, Bristol, R. I.

BUCKLEY, MISS M. L., Bureau of Pensions.

BURNETT, CHARLES A., *c*, 620 Burke Building, Seattle, Wash.

BURTON, PROF. A. E., *a*, Massachusetts Institute of Technology, Boston, Mass.

CAMPBELL, M. R., Geological Survey.

CANNON, H. B., Department of Agriculture.

CANTWELL, LIEUT. J. C., U. S. R. M., *c*, 1818 Sacramento Street, San Francisco, Cal.

CARMAN, MISS ADA, 1351 Q Street.

CARROLL, CAPT. JAMES, *c*, Juneau, Alaska.

CHAMBERLIN, PROF. T. C., *c*, 772 Langdon Street, Madison, Wis.

CHAPIN, FREDERICK E., 3043 P Street.

CHAPIN, DR. J. H., Meriden, Conn.

CHAPMAN, R. H., *a*, U. S. Geological Survey, Berkeley, Cal.

CHATARD, DR. THOMAS M., *a*, Geological Survey.

CHENERY, LIEUT. COMDR. LEONARD, U. S. N., *c*, University Club, New York, N. Y.

CHESTER, COMDR. C. M., U. S. N., *c*, U. S. Naval Academy, Annapolis, Md.

CHRISTIE, JAMES H., *c*, Olga, Wash.

CHRISTIE, P. H., Geological Survey.

CLARK, E. B., *a*, Geological Survey.

CLARK, DR. WM. B., *c*, Johns Hopkins University, Baltimore, Md.

CLOVER, LIEUT. COMDR. RICHARDSON, U. S. N., Hydrographic Office.

COLE, T. L., 12 Corcoran Building.

COLONNA, B. A., 138 B Street NE.

COLTON, FRANCIS, The Shoreham.

COMSTOCK, MRS. SARAH C., 1464 Rhode Island Avenue.

COOK, FRED. W., *c*, P. O. Box 140, Sault de Ste. Marie, Mich.

COURT, E. E., Hydrographic Office.

CRAIGHEAD, REV. DR. J. G., 1223 Eleventh Street.

CROFFUT, W. A., Geological Survey.

CUMMIN, ROBT. D., *a*, Geological Survey.

CUMMINGS, PROF. GEO. J., Howard University.

CUNNINGHAM, JOHN M., *c*, Cosmos Club, San Francisco, Cal.

CURTIS, WILLIAM E., *a*, 2 Lafayette Square.

DALL, MRS. CAROLINE H., 1526 Eighteenth Street.

DALL, WM. H., National Museum.

DALY, HON. CHAS. P., 84 Clinton Place, New York, N. Y.

DARTON, N. H., Geological Survey.

DAVIDGE, WALTER DORSEY, JR., 1 Corcoran Building.

DAVIDSON, PROF. GEORGE, *a*, *c*, U. S. Coast and Geodetic Survey, San Francisco, Cal.

DAVIS, ARTHUR P., *a*, U. S. Geological Survey, Los Angeles, Cal.

DAVIS, PROF. W. M. *a*, 2 Bond Street, Cambridge, Mass.

DAWSON, MISS A. B., Geological Survey.

DAY, DR. DAVID T., Geological Survey.

DAY, E. WARREN, War Department.

DENNEY, MISS L. A., 707 Thirteenth Street.

DENNY, A. A., *c*, 1328 Front Street, Seattle, Wash.

DIEBITSCH, EMIL, U. S. Naval Station, Port Royal, S. C.

DILLER, J. S., *a*, Geological Survey.

DOBBINS, J. W., U. S. Geological Survey, Berkeley, Cal.

DOUGLAS, E. M., *a*, Geological Survey.

DOW, CAPT. JOHN M., 83 W. Seventy-first Street, New York, N. Y.

DUNCKLEE, JOHN B., 912 French Street.

DUNNINGTON, A. F, *a*, Geological Survey.

DURAND, JOHN, 164 Bd. Montparnasse, Paris, France.

DUTTON, MAJ. C. E., U. S. A., *a*, San Antonio, Tex.

DYER, LIEUT. G. L., U. S. N., Navy Pay Office, San Francisco, Cal.

EDMANDS, PROF. J. RAYNER, Harvard University, Cambridge, Mass.

EDSON, JOHN JOY, 1003 F Street.

EDSON, JOSEPH R., *a*, 1003 F Street.

EIMBECK, WILLIAM, Coast and Geodetic Survey.

ELDRIDGE, G. H., Geological Survey.

ELIOT, CHARLES, Room 50, 50 State Street, Boston, Mass.

ELLICOTT, ENS. JOHN M., U. S. N., 2023 I Street.

ELMORE, HERBERT W., Geological Survey.

ERBACH, JOHN, Geological Survey.

EVANS, H. C., 804 Eleventh Street.

FAIRCHILD, PROF. H. L., *c*, University of Rochester, Rochester, N. Y.

FAIRFIELD, GEORGE A., *a*, Coast and Geodetic Survey.

FAIRFIELD, W. BROWNE, *a*, Coast and Geodetic Survey.

FARMER, R. A., Geological Survey.

FERNOW, B. E., *a*, Department of Agriculture.

FEUSIER, H. E. CLERMONT, 819 Grove Street, San Francisco, Cal.

FISCHER, E. G., *a*, Coast and Geodetic Survey.

FISCHER, L. A., Coast and Geodetic Survey.

FITCH, C. H., *a*, 3025 N Street.

FLEMER, J. A., 412 A Street SE.

FLETCHER, L. C., *a*, Geological Survey.

FLETCHER, DR. ROBERT, *a*, Army Medical Museum.

FLINT, CHARLES, 1519 O Street.

FLINT, COL. WESTON, 1101 K Street.

FLOYD, FRED. W., 539 W. Twentieth Street, New York, N. Y.

FOGG, LINDLEY, Sixth Auditor's Office.

FOSTER, PROF. RICHARD, Howard University.

FRASER, DANIEL, 458 Pennsylvania Avenue.

FREER, DR. JAMES A., 1523 I Street.

Fuller, Miss Adelaide H.,	1321 Rhode Island Avenue.
Gage, N. P., *a*,	Seaton School.
Gane, H. S., *c*,	Johns Hopkins University, Baltimore, Md.
Gannett, Henry, *a*,	Geological Survey.
Gannett, S. S., *a*,	Geological Survey.
Gardner, C. L.,	1710 Sixteenth Street.
Garrison, Miss Carl L.,	Phelps School.
Gilbert, G. K., *a*,	Geological Survey.
Gill, Wilson L., *c*,	Room 57, 115 Broadway, New York, N. Y.
Gilman, Dr. Daniel C., *a*,	Johns Hopkins University, Baltimore, Md.
Goldie, R. H., *c*,	P. O. Box 1110, Seattle, Wash.
Goodall, F. H.,	Second Auditor's Office.
Goodall, Otis B.,	232 P Street.
Goode, Dr. G. Brown, *a*,	Smithsonian Institution.
Goode, R. U., *a*,	Geological Survey.
Goodfellow, Edward, *a*,	Coast and Geodetic Survey.
Goodison, Prof. John,	State Normal School, Ypsilanti, Mich.
Gorham, Geo. C.,	1763 Q Street.
Graham, Miss A. M.,	1234 Massachusetts Avenue.
Graham, Andrew B.,	1239 Pennsylvania Avenue.
Granger, F. D.,	Coast and Geodetic Survey.
Graves, Walter H.,	Geological Survey.
Greely, Gen. A. W., U. S. A., *a*,	1914 G Street.
Griffith, G. Berkeley,	1630 Rhode Island Avenue.

GRISWOLD, W. T., *a*, U. S. Geological Survey, Boise, Idaho.

GROEGER, G. G., *c*, 310 Chamber of Commerce Building, Chicago, Ill.

GULLIVER, F. P., *c*, Norwich, Conn.

GUNION, MRS. REBECCA E., 927 O Street.

GURLEY, CHARLES L., 1401 Sixteenth Street.

HACKETT, M., *a*, Geological Survey.

HAGADORN, LIEUT. CHAS. B., U. S. A., *c*, Fort Leavenworth, Kans.

HALE, L. P., *c*, Canton, N. Y.

HARRINGTON, PROF. MARK W., Weather Bureau

HARRIS, DR. T. W., Harvard University, Cambridge, Mass.

HARRISON, D. C., *a*, Geological Survey.

HARRISON, PROF. THOS. F., *c*, 221 W. Forty-fifth Street, New York, N. Y.

HARROD, MAJ. B. M., City Engineer's Office, New Orleans, La.

HART, PROF. ALBERT BUSHNELL, 15 Appian Way, Cambridge, Mass.

HART, JUAN, *c*, El Paso, Tex.

HASBROUCK, E. M., 1610 Fifteenth Street.

HASKELL, E. E., *a*, Coast and Geodetic Survey.

HAWKINS, GEO. T., Geological Survey.

HAY, PROF. ROBERT, P. O. Box 562, Junction City, Kans.

HAYDEN, EVERETT, *a*, Hydrographic Office.

HAYDEN, J. J., 929 K Street.

HAYES, DR. C. WILLARD, Geological Survey.

HAYES, PROF. ELLEN, *c*, Wellesley College, Wellesley, Mass.

HAYS, J. W., Oxford, N. C.

HAZARD, DANIEL L.,	Coast and Geodetic Survey.
HEATON, A. G.,	1618 Seventeenth Street.
HEILPRIN, GILES F.,	1227 Pennsylvania Avenue.
HENRY, A. J., *a*,	948 S Street.
HENSHAW, H. W., *a*,	Bureau of Ethnology.
HERRLE, G., *a*,	Hydrographic Office.
HERRON, WM. H., *a*,	Geological Survey.
HILL, PROF. R. T.,	910 Fifteenth Street.
HINDS, DR. CLARA BLISS,	1331 Fourteenth Street.
HINMAN, RUSSELL,	806 Broadway, New York, N. Y.
HITCHCOCK, PROF. C. H., *c*,	Dartmouth College, Hanover, N. H.
HOBBS, DR. WM. H., *c*,	University of Wisconson, Madison, Wis.
HODGKINS, PROF. H. L., *a*,	Columbian University.
HODGKINS, W. C.,	Coast and Geodetic Survey.
HOLDEN, PROF. E. S., *c*,	Lick Observatory, Mount Hamilton, Cal.
HOLDEN, MRS. L. E.,	P. O. Box 1027, Salt Lake, Utah.
HOLDEN, LUTHER L.,	7 Warren Square, Jamaica Plain, Mass.
HOLLERITH, HERMAN,	501 F Street.
HOLMES, PROF. J. A., *c*,	Chapel Hill, N. C.
HOLT, H. P. R.,	Takoma Park, D. C.
HORE, CAPT. EDWARD C., *c*,	Royal Geographical Society, London, England.
HORNADAY, W. T., *a*,	44 Niagara Street, Buffalo, N. Y.
HORNBLOWER, J. C.,	1402 M Street.
HOSKINS, PROF. L. M., *c*,	University of Wisconsin, Madison, Wis.

Hosmer, Edward Sturges, *l*,	1330 L Street.
Hotchkiss, Maj. Jed.,	Staunton, Va.
Hovey, Rev. Dr. H. C.,	60 Crescent Street, Middletown, Conn.
Howard, Ens. W. L., U. S. N., *c*,	Navy Pay Office, San Francisco, Cal.
Howell, D. J., *a*,	918 F Street.
Howell, Edwin E., *a*,	612 Seventeenth Street.
Hubbard, Gardiner G., *a*,	1328 Connecticut Avenue.
Hutchinson, John,	933 H Street.
Hutchinson, W. J.,	1707 Massachusetts Avenue.
Hyde, G. E.,	Geological Survey.
Hyde, John,	2820 P Street.
Iardella, C. T., *a*,	Coast and Geodetic Survey.
Ingraham, Prof. E. S., *c*,	Seattle, Wash.
Jackson, Rev. Dr. Sheldon,	1830 Ninth Street.
Jenney, Dr. W. P.,	Geological Survey.
Jennings, J. H., *a*,	Geological Survey.
Jewett, W. P., *c*,	180 E. Third Street, St. Paul, Minn.
Johnson, Miss Alice Burges,	501 Maple Avenue.
Johnson, A. B., *a*,	Light House Board.
Johnson, E. Kurtz,	1600 Massachusetts Avenue.
Johnson, Dr. H. L. E.,	1400 L Street.
Johnson, J. B.,	Howard University.
Johnson, Rev. J. G.,	381 Dearborn Avenue, Chicago, Ill.
Johnson, Jerome F.,	1326 F Street.

JOHNSON, MRS. MARY DAVIS, *c*, Sitka, Alaska.

JOHNSON, STUART P., U. S. Geological Survey, Berkeley, Cal.

JOHNSON, WILLARD D., *a*, U. S. Geological Survey, Berkeley, Cal.

JUDD, JOHN G., 420 Eleventh Street.

JUDSON, EGBERT, *c*, 402 Front Street, San Francisco, Cal.

JUNKEN, CHARLES, Coast and Geodetic Survey.

JUNKEN, CHAS. A., Ordnance Office, War Department.

JÜSSEN, EDMUND, In care W. Tudor, Temple, Ga.

KARL, ANTON, *a*, 1230 Eleventh Street.

KAUFFMANN, S. H., *a*, 1421 Massachusetts Avenue.

KAVANAUGH, MISS K., Sixth Auditor's Office.

KENASTON, PROF. C. A., *a*, Room 4, 26 Court Street, Brooklyn, N. Y.

KENDALL, MISS ELIZABETH, *c*, Wellesley College, Wellesley, Mass.

KENNAN, GEORGE, *a*, In care J. B. Pond, Everett House, New York, N.Y.

KENNEDY, DR. GEO. G., *l*, 284 Warren Street, Roxbury, Mass.

KENNON, LIEUT. L. W. V., U. S. A., War Department.

KERR, H. S., *c*, Salt Lake, Utah.

KERR, MARK B., *a*, 402 Front Street, San Francisco, Cal.

KIMBALL, E. F., Post Office Department.

KIMBALL, DR. E. S., 737 Thirteenth Street.

KIMBALL, S. I., *a*, Life-Saving Service.

KING, PROF. F. H., 1500 University Avenue, Madison, Wis.

KING, PROF. HARRY, *a*, Geological Survey.

KING, WM. B., 1328 Twelfth Street.

KLAKRING, ALFRED, Hydrographic Office.

KLOTZ, OTTO J., *c*, Interior Department, Preston, Ontario, Canada.

KNAPP, HON. LYMAN E., Sitka, Alaska.

KOCH, PETER, *a*, Bozeman, Mont

KRAMER, WILLIAM,

KÜBEL, S. J., Geological Survey.

LACKLAND, W. E., *a*, Geological Survey.

LADD, GEORGE E., Melrose Highlands, Mass.

LAMBERT, M. B., Geological Survey.

LAMBORN, DR. ROBERT H., 32 Nassau Street, New York, N. Y.

LAWSON, PROF. A. C., University of California, Berkeley, Cal.

LAWSON, MISS JEANNE W., 1231 New Hampshire Avenue.

LEACH, BOYNTON, Hydrographic Office.

LEVERETT, FRANK, *c*, U. S. Geological Survey, Madison, Wis.

LIBBEY, PROF. WILLIAM, JR., *c*, 20 Bayard Avenue, Princeton, N. J.

LINCOLN, JOHN J., Geological Survey.

LINDENKOHL, A., *a*, Coast and Geodetic Survey.

LINDENKOHL, H., *a*, Coast and Geodetic Survey.

LINDSLEY, WM. L., *c*, Corner Banner and Republican Streets, Seattle, Wash.

LITTLEHALES, G. W., 928 Twenty-third Street.

LOOKER, HENRY B., 918 F Street.

LOOKER, THOS. H., U. S. N., 1312 Thirtieth Street.

LOOMIS, HENRY B., *c*, Seattle, Wash.

LOVELL, W. H., Geological Survey.

LYONS, JOSEPH, 1003 F Street.

MCCARTENEY, LIEUT. CHAS. M., U. S. N., Hydrographic Office.

MCCRACKEN, R. H., *c*, P. O. Box 495, San Antonio, Tex.

MCGEE, MRS. ANITA NEWCOMB, 2410 Fourteenth Street.

MCGEE, W J, *a*, Geological Survey.

MCGILL, MISS MARY C., 336 C Street.

MCGRATH, JOHN E., Coast and Geodetic Survey.

MCKEE, REDICK H., *a*, U. S. Geological Survey, Berkeley, Cal.

MCKINNEY, R. C., *a*, Geological Survey.

MCLAUGHLIN, DR. T. N., 1226 N Street.

MACKAYE, J. M., *c*, Shirley, Mass.

MAHER, JAMES A., *a*, P. O. Box 35, Johnson City, Tenn.

MANNING, VAN. H., JR., *a*, Geological Survey.

MARINDIN, HENRY L., Coast and Geodetic Survey.

MARKS, DR. A. J., *c*, 419 Madison Street, Toledo, O.

MARSHALL, R. B., U. S. Geological Survey, Berkeley, Cal.

MASON, PROF. O. T., 1777 Massachusetts Avenue.

MATTHEWS, DR. W., U. S. A., *a*, Fort Wingate, N. M.

MELVILLE, ENG. IN CHIEF GEO. W., U. S. N., *a*, *l*, Navy Department.

MENDENHALL, DR. T. C., Coast and Geodetic Survey.

MENOCAL, CIV. ENG. A. G., U. S. N., *a*, 44 Wall Street, New York, N. Y.

MERRIAM, DR. C. HART, *a*, Department of Agriculture.

MERRILL, PROF. J. A., *c*, State Normal School, Warrensburg, Mo.

MESTON, R. D., 1227 L Street.

Metzger, F. P.,	Geological Survey.
Miley, A. E.,	Sixth Auditor's Office.
Mindeleff, Mme. Julié,	1401 Stoughton Street.
Mindeleff, Victor,	Ohio National Bank Building.
Mitchell, Prof. Henry, *a*,	18 Hawthorne Street, Roxbury, Mass.
Mosman, A. T., *a*,	Coast and Geodetic Survey.
Muir, Prof. John,	Martinez, Cal.
Muir, Ens. W. C. P., U. S. N.,	In care Hon. J. L. Beckham, Shelbyville, Ky.
Munroe, Hersey,	Geological Survey.
Murlin, A. E.,	Geological Survey.
Murray, B. P.,	10 Third Street NE.
Nell, Louis, *a*,	Geological Survey.
Newell, F. H.,	Geological Survey.
Niles, Prof. Wm. H.,	Massachusetts Institute of Technology, Boston, Mass.
Nordhoff, Charles, *a*,	Coronado, Cal.
Norman-Neruda, L., *c*,	Devonshire Club, St. James Street, London, England.
Northup, C. G.,	U. S. Senate.
Noyes, Crosby S.,	1101 Pennsylvania Avenue.
Ogden, Herbert G., *a*,	Coast and Geodetic Survey.
O'Halloran, T. M.,	Hydrographic Office.
O'Hare, Daniel P.,	Geological Survey.
Oldrini, Prof. Alexander,	1437 L Street.
Olney, Chas. F.,	137 Jennings Avenue, Cleveland, O.
Osborn, Lieut. A. P., U. S. N., *c*,	Navy Pay Office, San Francisco, Cal.

OSBORNE, DR. GEO. L., *c*,
State Normal School, Warrensburg, Mo.

OTIS, HAMILTON, *c*,
Massachusetts Institute of Technology, Boston, Mass.

OTIS, WILLIAM H.,
U. S. Geological Survey, Berkeley, Cal.

PALMER, T. S.,
Department of Agriculture.

PARKER, E. W.,
Geological Survey.

PARSONS, FRANCIS H., *a*,
210 First Street SE.

PEALE, DR. A. C., *a*,
Geological Survey.

PEARY, CIV. ENG. R. E., U. S. N.,
Navy Department.

PELLEW, HENRY E.,
1637 Massachusetts Avenue.

PENROSE, R. A. F., JR.,
1331 Spruce Street, Philadelphia, Pa.

PERKINS, E. T., JR., *a*,
Geological Survey.

PETERS, EUGENE,
458 Pennsylvania Avenue.

PETERS, LIEUT. G. H., U. S. N., *a*,
Navy Department.

PETERS, WILLIAM J., *a*,
Geological Survey.

PETROFF, IVAN, *c*,
2148 Pennsylvania Avenue.

PHILLIPS, ASA E.,
District Engineer Department.

PHILLIPS, R. HENRY,
Room 110, 1419 New York Avenue.

PICKERING, PROF. EDWARD C.,
Harvard Observatory, Cambridge, Mass.

PICKING, CAPT. HENRY F., U. S. N.,
Navy Department.

PIERCE, JOSIAH, JR.,
11 South Street, Baltimore, Md.

POLLOK, ANTHONY,
620 F Street.

* POND, EDWIN J.,

POWELL, MAJ. J. W., *a*,
Geological Survey.

POWELL, PROF. W. B., *a*,
Franklin School.

PRENTISS, DR. D. WEBSTER, *a*, 1101 Fourteenth Street.

PRINCE, HON. L. BRADFORD, *c*, Santa Fe, N. M.

PROWELL, GEO. R., *c*, Hanover, Pa.

PUMPELLY, PROF. RAPHAEL, U. S. Geological Survey, Newport, R. I.

RAMSEY, F. M., *c*, Lampasas, Tex.

RANKIN, REV. DR. J. E., Howard University.

REID, PROF. HARRY FIELDING, *c*, Case School of Applied Science, Cleveland, O.

RENSHAWE, JNO. H., *a*, Geological Survey.

RICE, PROF. WM. NORTH, *c*, Wesleyan University, Middletown, Conn.

RICHARDSON, DR. C. W., 1102 L Street.

RICHARDSON, T. J., *c*, 734 E. Fifteenth Street, Minneapolis, Minn.

RICHMOND, CHAS. W., In care U. S. Consul, Greytown, Nicaragua.

RICHTER, MISS C. M., 330 A Street SE.

RICKSECKER, EUGENE, *a*, *c*, P. O. Box 289, Seattle, Wash.

RITTER, H. P., *a*, Coast and Geodetic Survey.

RIZER, COL. H. C., Geological Survey.

ROBBINS, A. G., *c*, Massachusetts Institute of Technology, Boston, Mass.

ROBERTS, A. C., *a*, Hydrographic Office.

ROCHESTER, GEN. WM. B., U. S. A., 1320 Eighteenth Street.

ROCK, MILES, 1430 Chapin Street.

ROGERS, JNO. B., *c*, Columbia Athletic Club.

ROTCH, A. LAWRENCE, 3 Commonwealth Avenue, Boston, Mass.

RUSSEL, LIEUT. EDGAR, U. S. A., *c*, Fort Sam Houston, San Antonio, Tex.

RUSSELL, ISRAEL C., *a*, Geological Survey.

Sanders, Henry P.,	1504 Twenty-first Street.
Sargent, Prof. C. S., *a*,	Brookline, Mass.
Schaap, C. H., *c*,	P. O. Box 32, Sitka, Alaska.
Schley, Capt. W. S., U. S. N., *a*,	Navy Department.
Schmidt, Fred. A.,	504 Ninth Street.
Schmitt, Ewald,	2235 Thirteenth Street.
Schwatka, Frederick, *c*,	1108 First Avenue, Rock Island, Ill.
Scidmore, Miss Eliza Ruhamah,	1502 Twenty-first Street.
Scott, W. O. N.,	603 Fifteenth Street.
Scudder, Prof. S. H., *a*,	Cambridge, Mass.
Shaler, Prof. N. S., *a*,	25 Quincy Street, Cambridge, Mass.
Shepard, Prof. Edward M.,	Drury College, Springfield, Mo.
Shepard, J. L. N., *c*,	402 Front Street, San Francisco, Cal.
Shepard, Capt. L. G., U. S. R. M.,	Treasury Department.
Sinclair, C. H.,	Coast and Geodetic Survey.
Sinclair, J. C.,	718 Arch Street, Philadelphia, Pa.
Sloan, Robert S., *c*,	Oswego, N. Y.
Smith, Edwin, *a*,	Coast and Geodetic Survey.
Smith, Rev. Ernest C., *c*,	Framingham, Mass.
Smith, Prof. Eugene A., *c*,	University, Ala.
Smith, Middleton, *a*,	P. O. Box 572.
Smock, Dr. J. C., *c*,	State Geological Survey, Trenton, N. J.
Snell, Merwin-Marie,	Catholic University of America.
Sommer, E. J., *a*,	Coast and Geodetic Survey.

SPENCER, JAS. W.,	Geological Survey.
STANLEY-BROWN, JOSEPH,	Geological Survey.
STANWOOD, JAMES HUGH, *c*,	Massachusetts Institute of Technology, Boston, Mass.
STEDMAN, J. M., *c*,	Trinity University, Durham, N. C.
STEIN, ROBERT,	Geological Survey.
STOCKTON, LT. COMDR. CHARLES H., U. S. N., *a*, *c*,	Naval War College, Newport, R. I.
STONE, JAMES S., *c*,	131 Vernon Street, Newton, Mass.
SUTTON, FRANK,	Geological Survey.
SWAN, HON. JAMES G., *c*,	Port Townsend, Wash.
TALBOT, MRS. LAURA OSBORNE,	927 P Street.
TARR, R. S., *c*,	Cornell University, Ithaca, N. Y.
TAYLOR, DANIEL F.,	918 F Street.
TAYLOR, JAS. L.,	1515 Twentieth Street.
THOMAS, MISS MARY VON E., *a*,	235 New Jersey Avenue SE.
THOMPSON, PROF. A. H., *a*,	Geological Survey.
THOMPSON, GILBERT, *a*,	Geological Survey.
THOMPSON, LAURENCE, *a*,	1628 S Street.
THOMPSON, CAPT. R. E., U. S. A., *a*,	War Department.
THOMPSON, J. W.,	1419 I Street.
TISDELL, WILLARD P.,	1323 Thirteenth Street.
TITTMANN, O. H., *a*,	Coast and Geodetic Survey.
TOWNSEND, MRS. JULIA C.,	1316 R Street.
TOWSON, R. M., *a*,	Geological Survey.
TURNER, J. HENRY,	Coast and Geodetic Survey.

TWEEDY, FRANK, *a*,	Geological Survey.
URQUHART, CHAS. F., *a*,	Geological Survey.
VAN HISE, PROF. C. R., *l*,	U. S. Geological Survey, Madison, Wis.
VASEY, DR. GEORGE, *a*,	Department of Agriculture.
VERGES, L. F., *c*,	Massachusetts Institute of Technology, Boston, Mass.
VINAL, W. IRVING, *a*,	1106 A Street NE.
VIVIAN, THOMAS J.,	212 New Jersey Avenue.
WADDEY, JOHN A.,	Hydrographic Office.
WADHAMS, LIEUT. A. V., U. S. N., *c*,	Andover, Mass.
WALCOTT, CHAS. D., *a*,	National Museum.
WALKER, ELTON D., *c*,	Fort Sheridan, Ill.
WALLACE, HAMILTON S., *a*,	Geological Survey.
WANAMAKER, HON. JOHN,	1731 I Street.
WARD, PROF. HENRY A., *c*,	16 College Avenue, Rochester, N. Y.
WARD, LESTER F., *a*,	1464 Rhode Island Avenue.
WARD, ROBERT DEC.,	Harvard University, Cambridge, Mass.
WARDER, B. H.,	1515 K Street.
WARTEGG, ERNST VON HESSE, *c*,	Bern, Switzerland.
WEED, WALTER HARVEY, *a*,	Geological Survey.
WEIR, JOHN B., *a*,	The Fredonia.
WELD, GEO. F.,	Metropolitan Club.
WELLING, DR. JAMES C., *a*,	1302 Connecticut Avenue.
WELLS, E. HAZARD,	The "Post," Cincinnati, O.

West, Preston C. F., *c*,	Calumet, Mich.
White, Dr. C. H., U. S. N.,	In care A. B. Gilman, Haverhill, Mass.
White, David,	Geological Survey.
Whiting, Henry L.,	U. S. Coast and Geodetic Survey, West Tisbury, Mass.
Wilder, Gen. J. T., *a*, *l*,	Johnson City, Tenn.
Wilder, Miss Mary,	Johnson City, Tenn.
Willenbücher, Eugene,	Coast and Geodetic Survey.
Willenbücher, W. C.,	Coast and Geodetic Survey.
Williams, Charles Augustus,	1301 Eighteenth Street.
Williams, Dr. Geo. H.,	803 Cathedral Street, Baltimore, Md.
Williams, Prof. H. S., *c*,	Cornell University, Ithaca, N. Y.
Williams, William, *c*,	University Club, New York, N. Y.
Willis, Bailey, *a*,	Geological Survey.
Willis, Mrs. Bailey,	1006 Twenty-second Street.
Willits, Hon. Edwin,	Department of Agriculture.
Wilson, H. M., *a*,	Geological Survey.
Wilson, Thomas,	1218 Connecticut Avenue.
Winchell, Prof. N. H., *c*,	120 State Street, Minneapolis, Minn.
Wines, M. W.,	Coast and Geodetic Survey.
Winslow, Prof. Arthur,	State Geological Survey, Jefferson City, Mo.
Winston, Isaac,	Coast and Geodetic Survey.
Winter, Dr. John T.,	1528 Ninth Street.
*Woodward, A. E.,	

Woodward, R. S., *a*,	Coast and Geodetic Survey.
Wright, Ens. Benjamin, U. S. N.,	Coast and Geodetic Survey.
Yeates, Chas. M., *a*, *c*,	404½ Liberty Street, Winston, N. C.
Young, F. A.,	Coast and Geodetic Survey.

Summary.

Active members	373
Corresponding members	95
Life members	6
Total	474